

Service  
Service  
Service

LC4.7E  
AA



For PDP see: Supplement service manual for SDI plasma panels, 312278514940

Service Manual

Contents	Page
1. Technical Specifications, Connections, and Chassis Overview	2
2. Safety Instructions, Warnings, and Notes	4
3. Directions for Use	5
4. Mechanical Instructions	6
5. Service Modes, Error Codes, and Faultfinding	9
6. Block Diagrams, Testpoint Overviews, and Waveforms	
Wiring Diagram	15
Block Diagram Audio and Video	16
Block Diagram Audio and Video	17
Testpoint Overview SSB (Top Side)	18
I2C IC Overview	19
Supply Voltage Overview	20
7. Circuit Diagrams and PWB Layouts	Diagram PWB
SSB: Tuner and VIF (Diagram A1)	21 38-47
SSB: Histogram and Hercules (Diagram A2)	22 38-47
SSB: Histogram and Hercules (Diagram A3)	23 38-47
SSB: Audio Delay line (LIPSYNC)(Diagr. A4)	24 38-47
SSB: Audio Amplifier (Diagram A5)	25 38-47
SSB: TV-Supply (Diagram A6)	26 38-47
SSB: Scaler (Diagram A7)	27 38-47
SSB: Scaler Supply (Diagram A8)	28 38-47
SSB: Scaler Interface (Diagram A9)	29 38-47
SSB: SDRAM (Diagram A10)	30 38-47
SSB: Flash / Control (Diagram A11)	31 38-47
SSB: HDMI (Reserved) (Diagram A12)	32 38-47
SSB: PCHD-MUX (Diagram A13)	33 38-47
SSB: Supply (Diagram A14)	34 38-47
SSB: DC-DC Converter (Diagram A15)	35 38-47
SSB: PCHD IO (Diagram A16)	36 38-47
SSB: Rear IO Scart (Diagram A17)	37 38-47
PDP Audio Panel (Diagram C)	48 49
Side IO Panel (Diagram D)	50 51

Contents	Page
Top Control Panel (Diagram E)	52 53
EMC Filter Panel (Diagram EMC)	54 55
LED and Switch Panel (Diagram J)	56 57
8. Alignments	59
9. Circuit Descriptions	63
Abbreviation List	68
IC Data Sheets	70
10 Spare Parts List	73
11 Revision List	79

©Copyright 2004 Philips Consumer Electronics B.V. Eindhoven, The Netherlands.  
All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, or otherwise without the prior permission of Philips.



## 1. Technical Specifications, Connections, and Chassis Overview

Index of this chapter:

1. Technical Specifications
2. Connection Overview
3. Chassis Overview

**Note:** Figures below can deviate slightly from the actual situation, due to the different set executions.

## 1.1 Technical Specifications

### 1.1.1 Vision

Display type	: LCD-IPS
Screen size	: 37" (94 cm), 16:9
	: 42" (106 cm), 16:9
Resolution (HxV pixels)	: 852x480
Contrast ratio	: 3000:1
Light output (cd/m <sup>2</sup> )	: 1000
Viewing angle (HxV degrees)	: 160x160
Tuning system	: PLL
TV Colour systems	: PAL B/G, D/K, I
	: SECAM B/G, D/K, L/L'
Video playback	: NTSC M/N 4.43
	: PAL B/G
	: SECAM L/L'
Supported inputs	: VGA (640x350)
	: VGA (640x480)
	: VGA (720x400)
	: MAC (640x480)
	: MAC (832x624)
	: SVGA (800x600)
	: XVGA (1024x768)
	: WXGA (1280x768)
	: PAL 576i 1fH CVI
	: NTSC 480i 1fH CVI
	: PAL 576p 2fH HD
	: NTSC 480p 2fH HD
	: ATSC 720p 2fH HDMI
	: ATSC 1080i 2fH
	HDMI
Channel selections	: 100 presets
	: UVSH
Aerial input	: 75 ohm, Coax
	: IEC-type

### 1.1.2 Sound

Sound systems	: FM-mono
	: AM-mono
	: FM-stereo B/G
	: NICAM B/G, D/K, I, L
Maximum power ( $W_{RMS}$ )	: 2 x 15

### 1.1.3 Miscellaneous

Power supply:

- Mains voltage ( $V_{AC}$ ) : 90 - 264
- Mains frequency (Hz) : 50

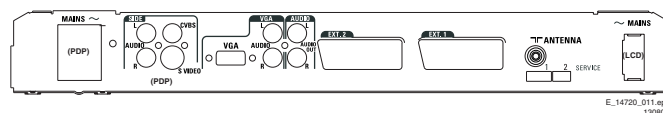
Ambient conditions:

- Temperature range (deg. C) : +5 to +40
- Maximum humidity : 90% R.H.

## 1.2 Connection Overview




**Note:** The following connector colour abbreviations are used (acc. to DIN/IEC 757): Bk= Black, Bu= Blue, Gn= Green, Gy= Grey, Rd= Red, Wh= White, and Ye= Yellow.

### 1.2.1 Rear Connections







### Figure 1-1 Rear I/O

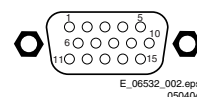
**Cinch: Video CVBS - In. Audio - In**

Wh - Audio L	0.5 V <sub>RMS</sub> / 10kohm	
Rd - Audio R	0.5 V <sub>RMS</sub> / 10kohm	
Ye - Video CVBS	1 V <sub>PP</sub> / 75 ohm	








**SVHS (Hosiden): Video Y/C - In**

1	- Ground Y	Gnd	
2	- Ground C	Gnd	
3	- Video Y	1 V <sub>PP</sub> / 75 ohm	
4	- Video C	0.3 V <sub>PP</sub> / 75 ohm	

**VGA: Video RGB - In**



### Figure 1-2 VGA Connector


1	- Video Red	0.7 V <sub>PP</sub> / 75 ohm	
2	- Video Green	0.7 V <sub>PP</sub> / 75 ohm	
3	- Video Blue	0.7 V <sub>PP</sub> / 75 ohm	
4	- n.c.		
5	- Ground	Gnd	
6	- Ground Red	Gnd	
7	- Ground Green	Gnd	
8	- Ground Blue	Gnd	
9	- +5V_DC	+5 VDC	
10	- Ground Sync	Gnd	
11	- n.c.		
12	- DDC_SDA	DDC data	
13	- H-sync	0 - 5 V	
14	- V-sync	0 - 5 V	
15	- DDC_SCL	DDC clock	

**Cinch: VGA (PC) Audio - In**

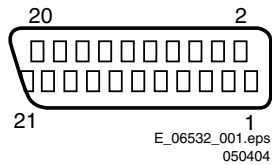
Rd - Audio - R       $0.5 V_{RMS} / 10 \text{ kohm}$       

Wh - Audio - L       $0.5 V_{RMS} / 10 \text{ kohm}$       

**Cinch: Audio - Out**

Rd - Audio - R      0.5 V<sub>RMS</sub> / 10 kohm      

Wh - Audio - L      0.5 V<sub>RMS</sub> / 10 kohm      

**External 2: Video CVBS/YC - In/Out, Audio - In/Out**

**Figure 1-3 SCART connector**

1	- Audio R	0.5 V <sub>RMS</sub> / 1 kohm	⊕
2	- Audio R	0.5 V <sub>RMS</sub> / 10 kohm	⊕
3	- Audio L	0.5 V <sub>RMS</sub> / 1 kohm	⊕
4	- Ground Audio	Gnd	⊥
5	- Ground Blue	Gnd	⊥
6	- Audio L	0.5 V <sub>RMS</sub> / 10 kohm	⊕
7	- Video C	0.7 V <sub>PP</sub> / 75 ohm	⊕
8	- Function Select	0 - 2 V: INT 4.5 - 7 V: EXT 16:9 9.5 - 12 V: EXT 4:3	⊕
9	- Ground Green	Gnd	⊥
10	- Easylink P50	0 - 5 V / 4.7 kohm	⊕
11	- n.c.		
12	- n.c.		
13	- Ground Red	Gnd	⊥
14	- Ground FBL	Gnd	⊥
15	- Video C	0.7 V <sub>PP</sub> / 75 ohm	⊕
16	- n.c.		
17	- Ground Video	Gnd	⊥
18	- n.c.		
19	- Video CVBS	1 V <sub>PP</sub> / 75 ohm	⊕
20	- Video Y/CVBS	1 V <sub>PP</sub> / 75 ohm	⊕
21	- Shield	Gnd	⊥

**External 1: Video RGB/YUV-In, CVBS-In/Out, Audio-In/Out**

1	- Audio R	0.5 V <sub>RMS</sub> / 1 kohm	⊕
2	- Audio R	0.5 V <sub>RMS</sub> / 10 kohm	⊕
3	- Audio L	0.5 V <sub>RMS</sub> / 1 kohm	⊕
4	- Ground Audio	Gnd	⊥
5	- Ground Blue	Gnd	⊥
6	- Audio L	0.5 V <sub>RMS</sub> / 10 kohm	⊕
7	- Video Blue/U	0.7 V <sub>PP</sub> / 75 ohm	⊕
8	- Function Select	0 - 2 V: INT 4.5 - 7 V: EXT 16:9 9.5 - 12 V: EXT 4:3	⊕
9	- Ground Green	Gnd	⊥
10	- n.c.		
11	- Video Green/Y	0.7 or 1 V <sub>PP</sub> / 75 ohm	⊕
12	- n.c.		
13	- Ground Red	Gnd	⊥
14	- n.c.		
15	- Video Red/V	0.7 V <sub>PP</sub> / 75 ohm	⊕
16	- RGB Ctrl	0 - 0.4 V: INT 1 - 3 V: EXT / 75 ohm	⊕
17	- Ground Video	Gnd	⊥
18	- Ground RGB Ctrl	Gnd	⊥
19	- Video CVBS	1 V <sub>PP</sub> / 75 ohm	⊕
20	- Video CVBS	1 V <sub>PP</sub> / 75 ohm	⊕
21	- Shield	Gnd	⊥

**Aerial - In**

-	- IEC-type (EU)	Coax, 75 ohm	⊥
---	-----------------	--------------	---

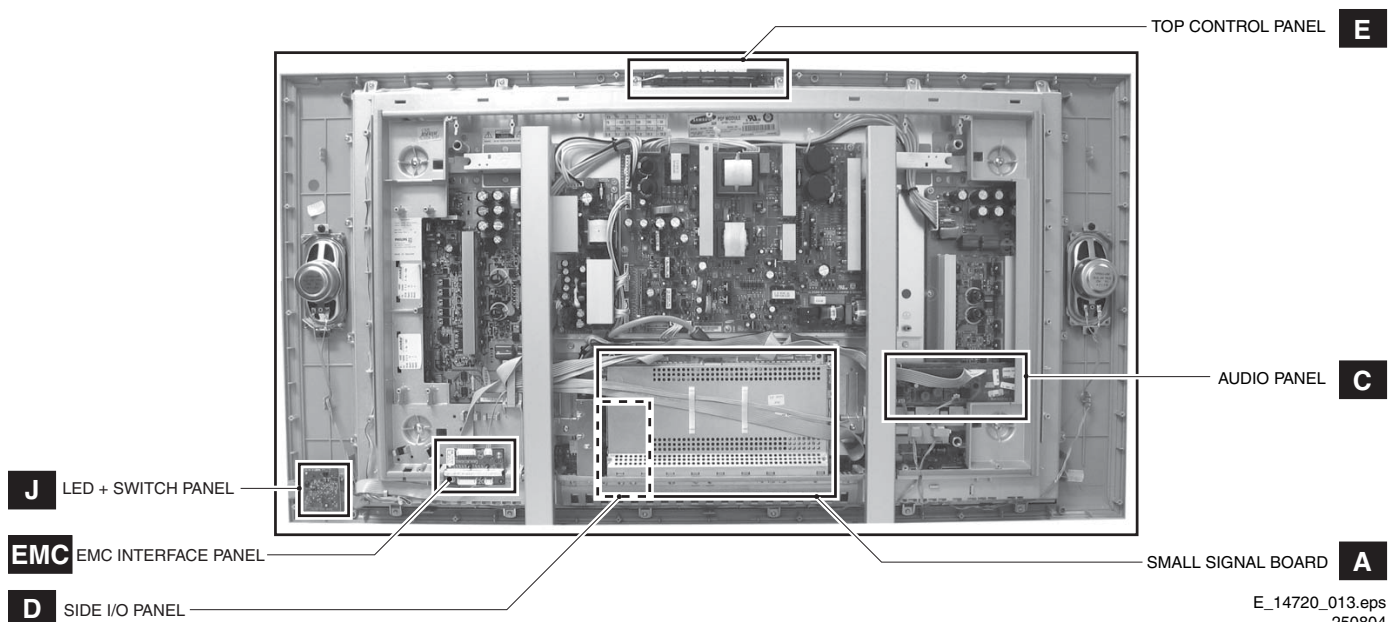
**Service connector 1 (UART)**

1	- UART_TX	Transmit data	⊕
2	- Ground	Gnd	⊥
3	- UART_RX	Receive data	⊕

**Service connector 2 (ComPair)**

1	- SDA-S	I <sup>2</sup> C Data (0 - 5 V)	⊕
2	- SCL-S	I <sup>2</sup> C Clock (0 - 5 V)	⊕
3	- Ground	Gnd	⊥

### 1.3 Chassis Overview


**Figure 1-4 PWB / CBA locations**

## 2. Safety Instructions, Warnings, and Notes

### 2.1 Safety Instructions

Safety regulations require that **during** a repair:

- Connect the set to the AC Power via an isolation transformer (> 800 VA).
- Replace safety components, indicated by the symbol ▲, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.

Safety regulations require that **after** a repair, the set must be returned in its original condition. Pay in particular attention to the following points:

- Route the wire trees correctly and fix them with the mounted cable clamps.
- Check the insulation of the AC Power lead for external damage.
- Check the strain relief of the AC Power cord for proper function.
- Check the electrical DC resistance between the AC Power plug and the secondary side (only for sets which have a AC Power isolated power supply):
  1. Unplug the AC Power cord and connect a wire between the two pins of the AC Power plug.
  2. Set the AC Power switch to the "on" position (keep the AC Power cord unplugged!).
  3. Measure the resistance value between the pins of the AC Power plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 Mohm and 12 Mohm.
  4. Switch "off" the set, and remove the wire between the two pins of the AC Power plug.
- Check the cabinet for defects, to avoid touching of any inner parts by the customer.

### 2.2 Warnings

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD ▲). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential. Available ESD protection equipment:
  - Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and earth cable) 4822 310 10671.
  - Wristband tester 4822 344 13999.
- Be careful during measurements in the high voltage section.
- Never replace modules or other components while the unit is switched "on".
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

### 2.3 Notes

#### 2.3.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⊥), or hot ground (⌋), depending on the tested area of circuitry. The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode (see chapter 5) with a colour bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz for PAL, or 61.25 MHz for NTSC (channel 3).

- Where necessary, measure the waveforms and voltages with (⌋) and without (⌋) aerial signal. Measure the voltages in the power supply section both in normal operation (Ⓢ) and in standby (Ⓢ). These values are indicated by means of the appropriate symbols.
- The semiconductors indicated in the circuit diagram and in the parts lists, are interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.
- Manufactured under license from Dolby Laboratories. "Dolby" and the "double-D symbol", are trademarks of Dolby Laboratories.

#### 2.3.2 Schematic Notes

- All resistor values are in ohms and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kohm).
- Resistor values with no multiplier may be indicated with either an "E" or an "R" (e.g. 220E or 220R indicates 220 ohm).
- All capacitor values are given in micro-farads ( $\mu = \times 10^{-6}$ ), nano-farads ( $n = \times 10^{-9}$ ), or pico-farads ( $p = \times 10^{-12}$ ).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An "asterisk" (\*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed in the Electrical Replacement Parts List. Therefore, always check this list when there is any doubt.

#### 2.3.3 Rework on BGA (Ball Grid Array) ICs

##### General

Although (LF)BGA assembly yields are very high, there may still be a requirement for component rework. By rework, we mean the process of removing the component from the PWB and replacing it with a new component. If an (LF)BGA is removed from a PWB, the solder balls of the component are deformed drastically so the removed (LF)BGA has to be discarded.

##### Device Removal

As is the case with any component that, it is essential when removing an (LF)BGA, the board, tracks, solder lands, or surrounding components are not damaged. To remove an (LF)BGA, the board must be uniformly heated to a temperature close to the reflow soldering temperature. A uniform temperature reduces the chance of warping the PWB. To do this, we recommend that the board is heated until it is certain that all the joints are molten. Then carefully pull the component off the board with a vacuum nozzle. For the appropriate temperature profiles, see the IC data sheet.

##### Area Preparation

When the component has been removed, the vacant IC area must be cleaned before replacing the (LF)BGA.

Removing an IC often leaves varying amounts of solder on the mounting lands. This excessive solder can be removed with either a solder sucker or solder wick. The remaining flux can be removed with a brush and cleaning agent.

After the board is properly cleaned and inspected, apply flux on the solder lands and on the connection balls of the (LF)BGA.

**Note:** Do not apply solder paste, as this has shown to result in problems during re-soldering.

**Device Replacement**

The last step in the repair process is to solder the new component on the board. Ideally, the (LF)BGA should be aligned under a microscope or magnifying glass. If this is not possible, try to align the (LF)BGA with any board markers. To reflow the solder, apply a temperature profile according to the *IC data sheet*. So as not to damage neighbouring components, it may be necessary to reduce some temperatures and times.

**More Information**

For more information on how to handle BGA devices, visit this URL: [www.atyourservice.ce.philips.com](http://www.atyourservice.ce.philips.com) (needs subscription, not available for all regions) ). After login, select "Magazine", then go to "Workshop Information". Here you will find Information on how to deal with BGA-ICs.

**2.3.4 Lead Free Solder**

Some PWBs in this chassis are "lead-free **prepared**". This is indicated on the PWB by the PHILIPS lead-free logo (either by a service-printing or by a sticker). It does not mean that lead-free solder is actually used!

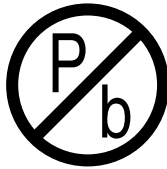


Figure 2-1 Lead-free logo

## 3. Directions for Use

You can download this information from the following websites:

<http://www.philips.com/support>

<http://www.p4c.philips.com>

Due to this fact, some rules have to be respected by the workshop during a repair:

- Use only lead-free soldering tin Philips SAC305 with order code 0622 149 00106. If lead-free solder paste is required, please contact the manufacturer of your soldering equipment.
- Use only adequate solder tools applicable for lead-free soldering tin.
- Adjust your solder tool so that a temperature around 217 - 220 deg. C is reached at the solder joint.
- Do not mix lead-free soldering tin with leaded soldering tin; this will lead to unreliable solder joints!
- Use only original spare parts listed in this manual. These are lead-free parts!
- On the website [www.atyourservice.ce.philips.com](http://www.atyourservice.ce.philips.com) (needs subscription, not available for all regions) you can find more information on:
  - Aspects of lead-free technology.
  - BGA (de-)soldering, heating-profiles of BGAs used in Philips sets, and others.

**2.3.5 Practical Service Precautions**

- **It makes sense to avoid exposure to electrical shock.** While some sources are expected to have a possible dangerous impact, others of quite high potential are of limited current and are sometimes held in less regard.
- **Always respect voltages.** While some may not be dangerous in themselves, they can cause unexpected reactions - reactions that are best avoided. Before reaching into a powered TV set, it is best to test the high voltage insulation. It is easy to do, and is a good service precaution.

## 4. Mechanical Instructions

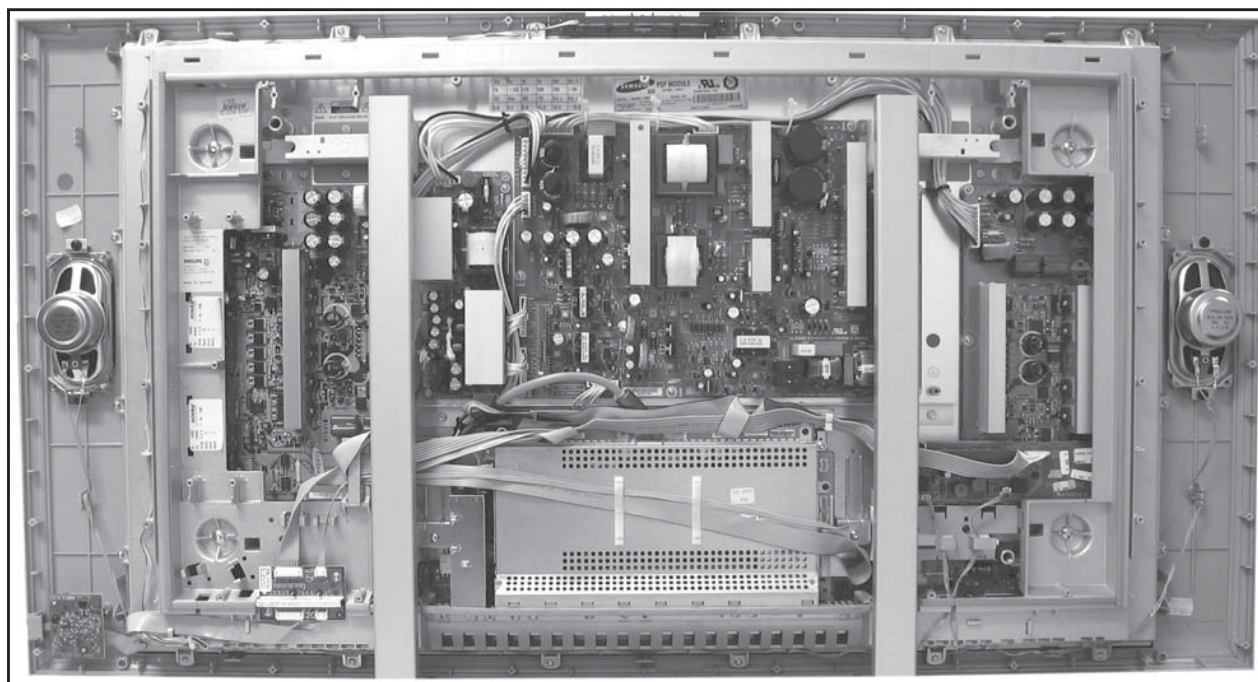
Index of this chapter:

1. Cable Dressing
2. Service Positions
3. Assy/Panel Removal
4. Re-assembly

### Notes:

- Figures below can deviate slightly from the actual situation, due to the different set executions.
- Follow the disassemble instructions in described order.

### 4.1 Cable Dressing



E\_14720\_012.eps  
130804

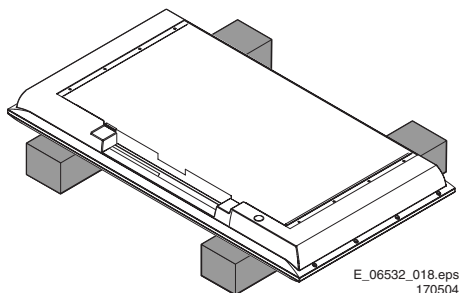
Figure 4-1 Cable dressing

### 4.2 Service Positions

For easy servicing of this set, there are a few possibilities created:

- The buffers from the packaging (see figure "Rear cover").
- Foam bars (created for service).
- Aluminium service stands (created for Service).

#### 4.2.1 Foam Bars

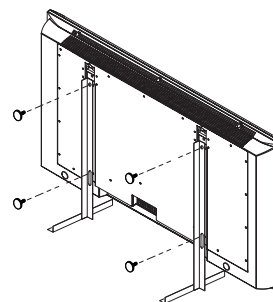


E\_06532\_018.eps  
170504

Figure 4-2 Foam bars

The foam bars (order code 3122 785 90580 for two pieces) can be used for all types and sizes of Flat TVs. By laying the TV face down on the (ESD protective) foam bars, a stable situation is created to perform measurements and alignments. By placing a mirror under the TV, you can monitor the screen.

#### 4.2.2 Aluminium Stands



E\_06532\_019.eps  
170504

Figure 4-3 Aluminium stands (drawing of Mkl)

The aluminium stands (order code 3122 785 90480) can be mounted with the back cover removed or still left on. So, the stand can be used to store products or to do measurements. It is also very suitable to perform duration tests without taking much space, without having the risk of overheating, or the risk of products falling. The stands can be mounted and removed quick and easy with use of the delivered screws that can be tightened and loosened manually without the use of tools. See figure above.

**Note:** Only use the delivered screws to mount the monitor to the stands.

## 4.3 Assy/Panel Removal

### 4.3.1 Metal Back Plate

**Warning:** Disconnect the mains power cord before you open the set.

1. Place the TV set upside down on a table top, using the foam bars (see part "Foam Bars").  
**Caution:** do **not** put pressure on the display, but let the monitor lean on the speakers or the Front cover.
2. Remove all T10 screws from the metal back plate.
3. Then, remove the four "mushrooms" from the back plate.
4. Lift the back plate from the set. Make sure that wires and flat foils are not damaged during the back plate removal.

### 4.3.2 Rear Cover

1. Remove the screws that secure the rear cover. The screws are located at the top, bottom, left and right sides.
2. Lift the rear cover from the cabinet. Make sure that wires and flat foils are not damaged during cover removal.

### 4.3.3 EMC Interface Panel

1. Disconnect the cables from the panel.
2. Remove the fixation screws.
3. Take out the panel.

### 4.3.4 LED/Switch Panel

1. Remove the fixation screws.
2. Take out the panel.
3. Disconnect the cable from the rear of the panel.

### 4.3.5 Top Control Panel

1. Remove the fixation screws.
2. Release the two fixation clamps and lift the panel out of the bracket.
3. Take out the panel.
4. Disconnect the cable from the panel.

### 4.3.6 Small Signal Panel (SSB) and Side I/O Panel

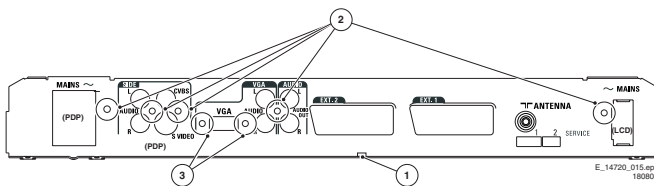


Figure 4-4 SSB Connector plate

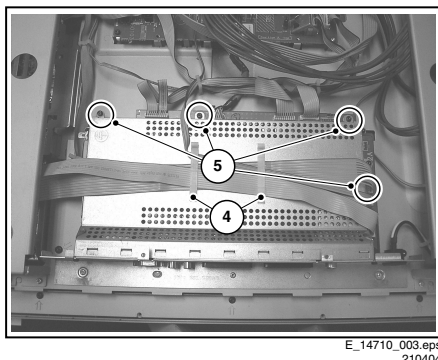


Figure 4-5 Shielding of the SSB

1. Remove the middle fixation screw (1) from the bottom side of the connector plate (as this holds the SSB bracket).  
**Note:** Sometimes it is easier to loosen the complete connector plate and remove it together with the SSB.
2. Remove all connector fixation screws (2) from the front side of the connector plate.
3. Remove the two female screw locks (3) of the VGA connector.
4. Release the plastic cable clips (4) on the shielding and disconnect all cables from the SSB.  
**Note:** Be careful with the fragile LVDS connector on the SSB.
5. Now, completely remove the SSB (together with all the shieldings) from the set.
6. Once the SSB is out, remove the fixation screws (5) from the shielding.
7. Remove the shielding, it hinges at the left side (acc. photo).
8. Remove the fixation screws that hold the panel(s), and take out the panel(s).

#### Notes:

- Pay special attention to the EMC foam on the SSB shielding. These must be replaced in their initial positions during set re-assembly.
- Insulate the tuner pins, so they cannot touch the shielding (see also figure "SDM Service jumper" in Chapter 5).

### 4.3.7 Audio Panel

1. Disconnect all cables from the panel.
2. Remove the fixation screws and take out the panel.

### 4.3.8 Plasma Panel

**Important:** Be sure to work in a dust free environment during the following activities. In addition, the use of (fabric) hand gloves is advised.

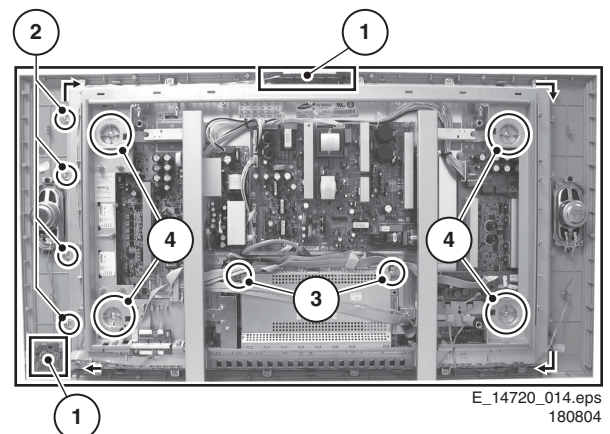


Figure 4-6 Plasma panel disassembly

#### Disassembly

1. Place the TV set face down on the foam bars. Place the bars at the edges of the set, so they will support the front frame and not only the glass plate!
2. Remove the LED/Switch and Top Control panels (1). Next step is to unplug the following cables (see also "Wiring Diagram" in Chapter 6):
  - AC Power (Mains) plug between Mains Filter and PSU (loosen cable from clamps).
  - All cables on the Audio panel.
  - LVDS plug on SSB. **Caution:** Be careful, because this connection is very fragile!
  - SSB supply plugs on PSU.
  - Audio Panel supply plug on PSU.

- Loudspeaker connections on speakers.
- 4. Remove all T10 parker screws around the frame (2).
- 5. Remove the two T10 tapping screws that hold the SSB (3).
- 6. Remove the four T25 screws (4) that hold the plasma panel.
- 7. Lift the (gold coloured) plastic frame together with its PWBs (except the Audio Panel) from the PDP panel.
- 8. Now the PDP (incl. the PSU and driving panels) can be removed.
- 9. Before sending the plasma panel to the NSO for repair or exchange, remove all its panels.

#### **Assembly**

In order to centre the (new) plasma panel correctly w.r.t. the glass plate, do the following:

1. Place the (new) plasma panel face down on foam bars.
2. Also, place the front assy (front panel with glass plate) on two other foam bars.
3. Mount the plastic frame on the plasma panel.
4. Lift the assy (frame and PDP), and place it into the front assy.
5. Now follow the above described disassembly process in reverse order.

### **4.4 Set Re-assembly**

To re-assemble the whole set, execute all processes in reverse order.

#### **Notes:**

- While re-assembling, make sure that all cables are placed and connected in their original position. See figure "Cable dressing".
- Pay special attention not to damage the EMC foams at the SSB shields. Control that EMC foams are put correctly on their places.

## 5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

1. Test Points
2. Service Modes
3. Problems and Solving Tips (related to CSM)
4. ComPair
5. Error Codes
6. The Blinking LED Procedure
7. Fault Finding and Repair Tips

### 5.1 Test Points

This chassis is equipped with test points in the service printing. In the schematics test points are identified with a rectangle box around Fxxx or Ixxx. These test points are specifically mentioned in the service manual as "half moons" with a dot in the centre.

Perform measurements under the following conditions:

- Television set in Service Default Alignment Mode.
- Video input: Colour bar signal.
- Audio input: 3 kHz left channel, 1 kHz right channel.

### 5.2 Service Modes

Service Default mode (SDM) and Service Alignment Mode (SAM) offers several features for the service technician, while the Customer Service Mode (CSM) is used for communication between the call centre and the customer.

This chassis also offers the option of using ComPair, a hardware interface between a computer and the TV chassis. It offers the abilities of structured troubleshooting, error code reading, and software version read-out for all chassis.

*Minimum requirements for ComPair:* a Pentium processor, a Windows OS, and a CD-ROM drive (see also paragraph "ComPair").

#### 5.2.1 Service Default Mode (SDM)

##### Purpose

- To create a predefined setting for measurements to be made.
- To override software protections.
- To start the blinking LED procedure.
- To inspect the error buffer.
- To check the life timer.

##### Specifications

- Tuning frequency: 475.25 MHz.
- Colour system: PAL B/G.
- All picture settings at 50% (brightness, colour contrast, hue).
- Bass, treble and balance at 50%; volume at 25%.
- All service-unfriendly modes (if present) are disabled. The service unfriendly modes are:
  - Timer / Sleep timer.
  - Child / parental lock.
  - Blue mute.
  - Hotel / hospital mode.
  - Auto shut off (when no "IDENT" video signal is received for 15 minutes).
  - Skipping of non-favourite presets / channels.
  - Auto-storage of personal presets.
  - Auto user menu time-out.
  - Auto Volume Levelling (AVL).

##### How to enter

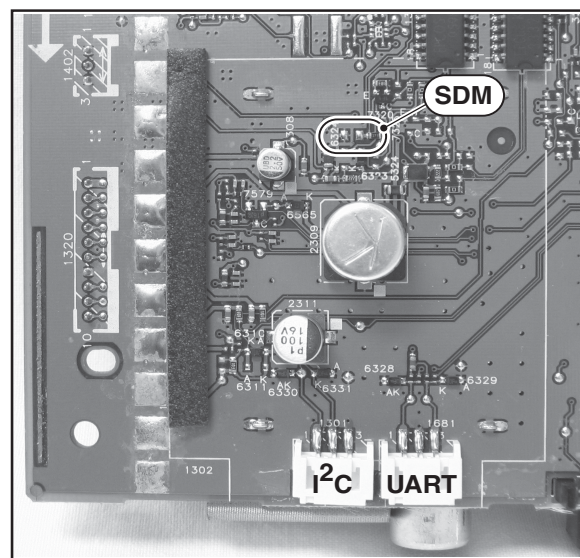
To enter SDM, use one of the following methods:

- Press the following key sequence on the remote control transmitter: "062596" directly followed by the MENU button

(do not allow the OSD display to time out between entries while keying the sequence).

- Short SDM jumper (item 4022, see Figure "Service jumper") on the TV board and apply AC Power. Remove the short after start-up.

**Caution:** Entering SDM by shorting "Service" jumpers will override the software protections. Do this only for a short period. **When doing this, the service-technician must know exactly what he is doing, as it could damage the television set.**



E\_14710\_062.eps  
260804

Figure 5-1 SDM Service jumper

After entering SDM, the following screen is visible, with SDM in the upper right corner of the screen to indicate that the television is in Service Default Alignment Mode.

```
00022 LC42EP1 2.03/S42GV1 2.02  SDM
ERR 0 0 0 0 0
OP 000 057 140 032 120 128 000
```

E\_14710\_006.eps  
240604

Figure 5-2 SDM menu (example from LC4.2E)

##### How to navigate

When you press the MENU button on the remote control, the set will switch on the normal user menu in the SDM mode.

##### How to exit

Switch the set to STANDBY by pressing the POWER button on the remote control transmitter.

If you turn the television set off by removing the mains (i.e., unplugging the television) or by using the POWER button on the TV set, the television set will remain in SDM when mains is re-applied, and the error buffer is not cleared.

### 5.2.2 Service Alignment Mode (SAM)

#### Purpose

- To change option settings.
- To display / clear the error code buffer.
- To perform alignments.

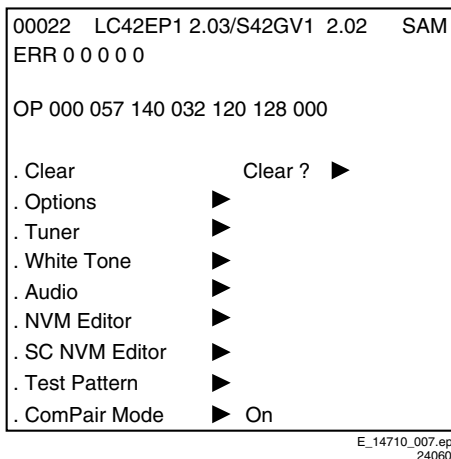
#### Specifications

- Operation hours counter (maximum five digits displayed).
- Software version, Error codes, and Option settings display.
- Error buffer clearing.
- Option settings.
- Software alignments (Tuner, White Tone, Geometry, and Audio).
- NVM Editor.
- ComPair Mode switching.

#### How to enter

Press the following key sequence on the remote control transmitter: "062596" directly followed by the OSD/STATUS/INFO button (do not allow the OSD display to time out between entries while keying the sequence).

After entering SAM, the following screen is visible, with SAM in the upper right corner of the screen to indicate that the television is in Service Alignment Mode.



E\_14710\_007.eps  
240604

Figure 5-3 SAM menu (example from LC4.2E)

#### Menu explanation

1. **LLLLL**. This represents the run timer. The run timer counts normal operation hours (including "on/off" switching), but does not count stand-by hours.
2. **AAAABCD-X.YY/EEEEEE\_F.GG**. This is the software identification of the Main/Scaler microprocessor:
  - **A**= the chassis name.
  - **B**= the region: E= Europe, A= Asia Pacific, U= NAFTA, L= LATAM.
  - **C**= the software diversity:
    - **Europe**: T= 1 pg TXT, F= Full TXT, V= Voice ctrl.
    - **LATAM and NAFTA**: N= Stereo non-dBx, S= Stereo dBx.
    - **Asian Pacific**: T= TXT, N= non-TXT, C= NTSC.
    - **ALL regions**: M= mono, D= DVD, Q= Mk2.
  - **D**= the language cluster number.
  - **X**= the Main software version number (updated with a major change that is incompatible with previous versions).
  - **YY**= the sub software version number (updated with a minor change that is compatible with previous versions).
  - **EEEEEE**= the Scaler SW cluster
  - **F**= the Scaler SW version no.
  - **GG**= the sub-version no.
3. **SAM**. Indication of the Service Alignment Mode.

4. **Error Buffer (ERR)**. Shows all errors detected since the last time the buffer was erased. Five errors possible.
5. **Option Bytes (OP)**. Shows all option settings. See "Options" in the Alignments section for a detailed description. Seven codes are available.
6. **Clear**. Erases the contents of the error buffer. Select the CLEAR menu item and press the CURSOR RIGHT key. The content of the error buffer is cleared.
7. **Options**. Used to set the option bits. See "Options" in the Alignments section for a detailed description.
8. **Tuner**. Used to align the tuner. See "Tuner" in the Alignments section for a detailed description.
9. **White Tone**. Used to align the white tone. See "White Tone" in the Alignments section for a detailed description.
10. **Audio**. No audio alignment is necessary for this television set.
11. **NVM Editor**. Can be used to change the NVM data in the television set.
12. **SC NVM Editor**. Can be used to edit Scaler NVM.
13. **Test Pattern**. For future use.
14. **ComPair**. Can be used to switch the television to "In System Programming" (ISP) mode, for software uploading via ComPair.  
**Caution:** When this mode is selected without ComPair connected, the TV will be blocked. Remove the AC power to reset the TV.

#### How to navigate

- In SAM, select menu items with the CURSOR UP/DOWN keys on the remote control transmitter. The selected item will be highlighted. When not all menu items fit on the screen, use the CURSOR UP/DOWN keys to display the next / previous menu items.
- With the CURSOR LEFT/RIGHT keys, it is possible to:
  - Activate the selected menu item.
  - Change the value of the selected menu item.
  - Activate the selected submenu.
- In SAM, when you press the MENU button twice, the set will switch to the normal user menus (with the SAM mode still active in the background). To return to the SAM menu press the MENU button again.
- When you press the MENU key in while in a submenu, you will return to the previous menu.

#### How to store SAM settings

To store the settings changed in SAM mode, leave the top level SAM menu by using the POWER button on the remote control transmitter or the television set.

#### How to exit

Switch the set to STANDBY by pressing the POWER button on the remote control transmitter or on the television set.

### 5.2.3 Customer Service Mode (CSM)

#### Purpose

The Customer Service Mode shows error codes and information on the TV's operation settings. The call centre can instruct the customer (by telephone) to enter CSM in order to identify the status of the set. This helps the call centre to diagnose problems and failures in the TV set before making a service call.

The CSM is a read-only mode; therefore, modifications are not possible in this mode.

#### How to enter

To enter CSM, press the following key sequence on the remote control transmitter: "123654" (do not allow the OSD display to time out between entries while keying the sequence).

Upon entering the Customer Service Mode, the following screen will appear:

```

1 00022 LC42EP1 2.03/S42GV1 2.02 CSM
2 CODES 0 0 0 0 0
3 OP 000 057 140 032 120 128 000
4
5
6 NOT TUNED
7 PAL
8 STEREO
9 CO 50 CL 50 BR 50
0 AVL Off

```

E\_14710\_008.eps  
240604

**Figure 5-4 CSM menu (example from LC4.2E)**

#### Menu explanation

1. Indication of the decimal value of the operation hours counter, Main/Scaler software version (see "Service Alignment Mode" for an explanation), and service mode (CSM= Customer Service Mode).
2. Displays the last five errors detected in the error code buffer.
3. Displays the option bytes.
4. Displays the type number version of the set (option).
5. Reserved.
6. Indicates the television is receiving an "IDENT" signal on the selected source. If no "IDENT" signal is detected, the display will read "NOT TUNED"
7. Displays the detected Colour system (e.g. PAL/NTSC).
8. Displays the detected Audio (e.g. stereo/mono).
9. Displays the picture setting information.
10. Displays the sound setting information.

#### How to exit

To exit CSM, use one of the following methods:

- Press the MENU, STATUS (or EXIT/INFO/[i+]), or POWER button on the remote control transmitter.
- Press the POWER button on the television set.

## 5.3 Problems and Solving Tips Related to CSM

### 5.3.1 Picture Problems

**Note:** The problems described below are all related to the TV settings. The procedures used to change the value (or status) of the different settings are described.

#### Picture too dark or too bright

*If:*

- The picture improves when you press the AUTO PICTURE button on the remote control transmitter, or
- The picture improves when you enter the Customer Service Mode,

*Then:*

1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the CURSOR UP/DOWN keys to highlight the PICTURE sub menu.
4. Press the CURSOR LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the CURSOR UP/DOWN keys (if necessary) to select BRIGHTNESS.

6. Press the CURSOR LEFT/RIGHT keys to increase or decrease the BRIGHTNESS value.
7. Use the CURSOR UP/DOWN keys to select PICTURE.
8. Press the CURSOR LEFT/RIGHT keys to increase or decrease the PICTURE value.
9. Press the MENU button on the remote control transmitter twice to exit the user menu.
10. The new PERSONAL preference values are automatically stored.

#### White line(s) around picture elements and text

*If:*

The picture improves after you have pressed the AUTO PICTURE button on the remote control transmitter,

*Then:*

1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the CURSOR UP/DOWN keys to highlight the PICTURE sub menu.
4. Press the CURSOR LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the CURSOR UP/DOWN keys to select SHARPNESS.
6. Press the CURSOR LEFT key to decrease the SHARPNESS value.
7. Press the MENU button on the remote control transmitter twice to exit the user menu.
8. The new PERSONAL preference value is automatically stored.

#### Snowy picture

Check CSM line 6. If this line reads "Not Tuned", check the following:

- Antenna not connected. Connect the antenna.
- No antenna signal or bad antenna signal. Connect a proper antenna signal.
- The tuner is faulty (in this case line 2, the Error Buffer line, will contain error number 10). Check the tuner and replace/repair the tuner if necessary.

#### Black and white picture

*If:*

- The picture improves after you have pressed the AUTO PICTURE button on the remote control transmitter,

*Then:*

1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the CURSOR UP/DOWN keys to highlight the PICTURE sub menu.
4. Press the CURSOR LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the CURSOR UP/DOWN keys to select COLOUR.
6. Press the CURSOR RIGHT key to increase the COLOUR value.
7. Press the MENU button on the remote control transmitter twice to exit the user menu.
8. The new PERSONAL preference value is automatically stored.

**Menu text not sharp enough**

If:

- The picture improves after you have pressed the AUTO PICTURE button on the remote control transmitter,

Then:

1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the CURSOR UP/DOWN keys to highlight the PICTURE sub menu.
4. Press the CURSOR LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the CURSOR UP/DOWN keys to select PICTURE.
6. Press the CURSOR LEFT key to decrease the PICTURE value.
7. Press the MENU button on the remote control transmitter twice to exit the user menu.
8. The new PERSONAL preference value is automatically stored.

## 5.4 ComPair

### 5.4.1 Introduction

ComPair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the European DST (service remote control), which allows faster and more accurate diagnostics. ComPair has three big advantages:

- ComPair helps you to quickly get an understanding on how to repair the chassis in a short time by guiding you systematically through the repair procedures.
- ComPair allows very detailed diagnostics (on I<sup>2</sup>C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I<sup>2</sup>C commands yourself because ComPair takes care of this.
- ComPair speeds up the repair time since it can automatically communicate with the chassis (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together with the Force/SearchMan electronic manual of the defective chassis, schematics and PWBs are only a mouse click away.

### 5.4.2 Specifications

ComPair consists of a Windows based fault finding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial (or RS232) cable.

For this chassis, the ComPair interface box and the TV communicate via a bi-directional service cable via the service connector(s).

The ComPair fault finding program is able to determine the problem of the defective television. ComPair can gather diagnostic information in two ways:

- Automatic (by communication with the television): ComPair can automatically read out the contents of the entire error buffer. Diagnosis is done on I<sup>2</sup>C/UART level. ComPair can access the I<sup>2</sup>C/UART bus of the television. ComPair can send and receive I<sup>2</sup>C/UART commands to the micro controller of the television. In this way, it is possible for ComPair to communicate (read and write) to devices on the I<sup>2</sup>C/UART buses of the TV-set.
- Manually (by asking questions to you): Automatic diagnosis is only possible if the micro controller of the television is working correctly and only to a certain extend. When this is not the case, ComPair will guide you through

the fault finding tree by asking you questions (e.g. *Does the screen give a picture? Click on the correct answer: YES / NO*) and showing you examples (e.g. *Measure test-point I7 and click on the correct oscillogram you see on the oscilloscope*). You can answer by clicking on a link (e.g. text or a waveform picture) that will bring you to the next step in the fault finding process.

By a combination of automatic diagnostics and an interactive question / answer procedure, ComPair will enable you to find most problems in a fast and effective way.

Beside fault finding, ComPair provides some **additional features** like:

- Up- or downloading of pre-sets.
- Managing of pre-set lists.
- Emulation of the (European) Dealer Service Tool (DST).
- If both ComPair and Force/SearchMan (Electronic Service Manual) are installed, all the schematics and the PWBs of the set are available by clicking on the appropriate hyperlink.

**Example:** *Measure the DC-voltage on capacitor C2568 (Schematic/Panel) at the Mono-carrier.*

- Click on the “Panel” hyperlink to automatically show the PWB with a highlighted capacitor C2568.
- Click on the “Schematic” hyperlink to automatically show the position of the highlighted capacitor.

### 5.4.3 How To Connect

1. First, install the ComPair Browser software (see the Quick Reference Card for installation instructions).
2. Connect the RS232 interface cable between a free serial (COM) port of your PC and the PC connector (marked with “PC”) of the ComPair interface.
3. Connect the mains adapter to the supply connector (marked with “POWER 9V DC”) of the ComPair interface.
4. Switch the ComPair interface “OFF”.
5. Switch the television set “OFF” with the POWER switch.
6. Connect the ComPair I<sup>2</sup>C/UART interface cable between the connector on the rear side of the ComPair interface (marked with “I<sup>2</sup>C” or for UART on the connector marked “VCR”) and the appropriate ComPair connector at the rear side of the TV (I<sup>2</sup>C or UART).

**Note:** Some chassis need an additional I<sup>2</sup>C extension cable due to a different connector pitch!

7. Plug the mains adapter in a mains outlet, and switch the interface “ON”. The green and red LEDs light up together. The red LED extinguishes after approx. 1 second while the green LED remains lit.
8. Start the ComPair program and read the “Introduction” chapter.

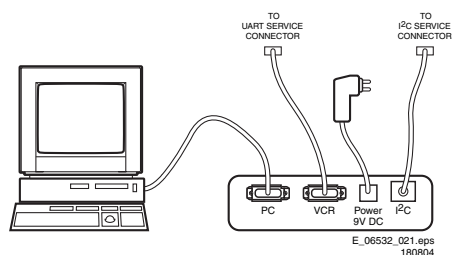


Figure 5-5 ComPair Interface connection

### 5.4.4 How To Order

ComPair order codes (EU/AP/LATAM):

- Starter kit ComPair32/SearchMan32 software and ComPair interface (excl. transformer): 3122 785 90450.
- ComPair interface (excluding transformer): 4822 727 21631.
- Starter kit ComPair32 software (registration version): 3122 785 60040.

- Starter kit SearchMan32 software: 3122 785 60050.
- ComPair32 CD (update): 3122 785 60070 (year 2002, 3122 785 60110 (year 2003).
- SearchMan32 CD (update): 3122 785 60080 (year 2002), 3122 785 60120 (year 2003), 3122 785 60130 (year 2004).
- ComPair I<sup>2</sup>C interface cable: 3122 785 90004.
- ComPair firmware upgrade IC: 3122 785 90510.
- Transformer (non-UK): 4822 727 21632.
- Transformer (UK): 4822 727 21633.
- ComPair I<sup>2</sup>C extension cable: 3139 131 03791.
- ComPair UART interface cable: 3122 785 90630.

**Note:** If you encounter any problems, contact your local support desk.

## 5.5 Error Codes

The error code buffer contains all errors detected since the last time the buffer was erased. The buffer is written from left to right. When an error occurs that is not yet in the error code buffer, it is displayed at the left side and all other errors shift one position to the right.

### 5.5.1 How To Read The Error Buffer

You can read the error buffer in 3 ways:

- On screen via the SAM (if you have a picture).  
**Examples:**
  - ERROR: 0 0 0 0 0: No errors detected
  - ERROR: 6 0 0 0 0: Error code 6 is the last and only detected error
  - ERROR: 9 6 0 0 0: Error code 6 was detected first and error code 9 is the last detected (newest) error
- Via the blinking LED procedure (when you have no picture). See “The Blinking LED Procedure”.
- Via ComPair.

### 5.5.2 How To Clear The Error Buffer

The error code buffer is cleared in the following cases:

- By using the CLEAR command in the SAM menu:
  - To enter SAM, press the following key sequence on the remote control transmitter: “062596” directly followed by the OSD/STATUS button (do not allow the OSD display to time out between entries while keying the sequence).
  - Make sure the menu item CLEAR is highlighted. Use the CURSOR UP/DOWN buttons, if necessary.
  - Press the CURSOR RIGHT button to clear the error buffer. The text on the right side of the “CLEAR” line will change from “CLEAR?” to “CLEARED”
- If an error does not reoccur within 50 hours it is deleted from the error buffer.

### 5.5.3 Error Codes

In case of non-intermittent faults, write down the errors present in the error buffer and clear the error buffer before you begin the repair. This ensures that old error codes are no longer present.

If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error and not the actual cause of the problem (for example, a fault in the protection detection circuitry can also lead to a protection).

**Table 5-1 Error code overview**

Error	Device	Error description	Check item	Diagram
0	Not applicable	-	-	-
1	Not applicable	-	-	-
2	Not applicable	-	-	-
3	Not applicable	-	-	-
4	GM1501 Scaler Flash-ROM	I <sup>2</sup> C error while communicating with the Genesis Scaler and/or Flash-ROM is faulty/empty	7401 7530	A7 A11
5	Not applicable	+5V protection	7930	A6
6	I <sup>2</sup> C bus	General I <sup>2</sup> C error	7011, 3088, 3096	A2
7	Not applicable	-	-	-
8	M24C32	I <sup>2</sup> C error while communicating with the Scaler EEPROM	7531	A11
9	M24C16	I <sup>2</sup> C error while communicating with the EEPROM	7099	A2
10	Tuner	I <sup>2</sup> C error while communicating with the PLL tuner	1302, 3302, 3303, 3327	A1
11	Not applicable	-	-	-
12	Not applicable	-	-	-
13	Not applicable	-	-	-
14	K4D263238M	Read-write error with the Scaler SDRAM	7501	A10
15	TDA9178T/N1	I <sup>2</sup> C error while communicating with Histogram	7560	A3
16	TDA9178T/N1	I <sup>2</sup> C error while communicating with EPLD on Pixel Plus panel	7560	A3

## 5.6 The Blinking LED Procedure

Using this procedure, you can make the contents of the error buffer visible via the front LED. This is especially useful when there is no picture.

When the SDM is entered, the front LED will blink the contents of the error-buffer:

- The Led blinks with as many pulses as the error code number, followed by a time period of 1.5 seconds, in which the Led is off.
- Then this sequence starts is repeated.

Any RC5 command terminates this sequence.

**Example** of error buffer: **12 9 6 0 0**

After entering SDM, the following occurs:

- 1 long blink of 5 seconds to start the sequence,
- 12 short blinks followed by a pause of 1.5 seconds,
- 9 short blinks followed by a pause of 1.5 seconds,
- 6 short blinks followed by a pause of 1.5 seconds,
- 1 long blink of 1.5 seconds to finish the sequence,
- The sequence starts again at 12 short blinks.

## 5.7 Fault Finding and Repair Tips

### Notes:

- It is assumed that the components are mounted correctly with correct values and no bad solder joints.
- Before any fault finding actions, check if the correct options are set.

### 5.7.1 NVM Editor

In some cases, it can be handy if one directly can change the NVM contents. This can be done with the "NVM Editor" in SAM mode. With this option, single bytes can be changed.

	Hex	Dec	Description
.ADR	0x000A	10	Existing value
.VAL	0x0000	0	New value
.Store	Store ?		

### 5.7.2 Load default NVM values

In case a blank NVM is placed or when the NVM content is corrupted, default values can be downloaded into the NVM. After the default values are downloaded it will be possible to start up and to start aligning the TV set. This is no longer initiated automatically; to initiate the download the following action has to be performed:

1. Switch the TV set "off" via the AC Power switch.
2. Short circuit the SDM jumpers (keep short-circuited).
3. Press P+ or Ch+ on the local keyboard (and keep it pressed).
4. Switch the TV set "on" via the AC Power switch.
5. When the set has started, the P+/Ch+ button can be released and the short circuit of the SDM jumpers can be removed.
6. The red LED will be on continuously to indicate that the download is initiated (normally when SDM is activated the red LED will start with the Blinking LED sequence).
7. Wait +/- 30 s (time needed to download default values to the NVM).

### 5.7.3 Tuner and IF

#### **No Picture in RF mode**

1. Check whether picture is present in EXT. If not, go to Video processing troubleshooting section.
2. If present, check that the Option settings are correct.
3. Check that all supply voltages are present.
4. Check if I<sup>2</sup>C lines are working correctly (3.3V).
5. Manually store a known channel and check if there is IF output at Tuner pin 11.
6. Feed in 105 dBuV at Tuner pin 11 and check whether there is RGB output from Video Processing IC. If yes, Tuner may be defect. Replace Tuner.

#### **Required system is not selected correctly**

1. Check whether a Service jumper (#4022, 0805 size) is present. If yes, remove it.

### 5.7.4 Video Processing

#### **No power**

1. Check +12 V and 3V3 at position 1910.
2. If no supply, check the connector 1910.
3. If it is correct, check the power supply board.

#### **Power supply is correct but no green LED**

1. Check if connectors 1005 and 1601 are properly inserted.
2. If yes, check if the 3V3 is present.

#### **No picture display**

1. Check the RGB signal.
2. If it is present, check 3-IC7016 (NE555).
3. If it has output, the problem is in SCALER part.
4. Otherwise, check H-out on pin 2 of NE555. If the input signal of pin2 is present, but no output, the IC is defect.

#### **Note:**

- If the H-out (pin 67) doesn't have signal or the level is low, check the output of NE555 (pin 3) during start up.

- If the H-out (pin 67) has a signal (or has a signal for a very short time), change IC7016 (NE555).

#### **No TV but PC is present**

1. Check if HSYNC and VSYNC are present at pin 3 of 7017 and 7015.
2. If they are present, check RGB output.
3. If there is no RGB output, the IC TDA120xx can be defect.

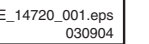
#### **Comb Filter not working**

Check Option Byte 5 in SAM (see also chapter 8 "Alignments").

### 5.7.5 Power Supply

This power supply is for Service a "black box". When defective, (this can be traced by error-codes in the error buffer, or by strange phenomena), a new panel must be ordered and after receipt, the defective panel must be send in for repair. For some basic voltage-measurements, you can use the block diagram(s) in Chapter 6.

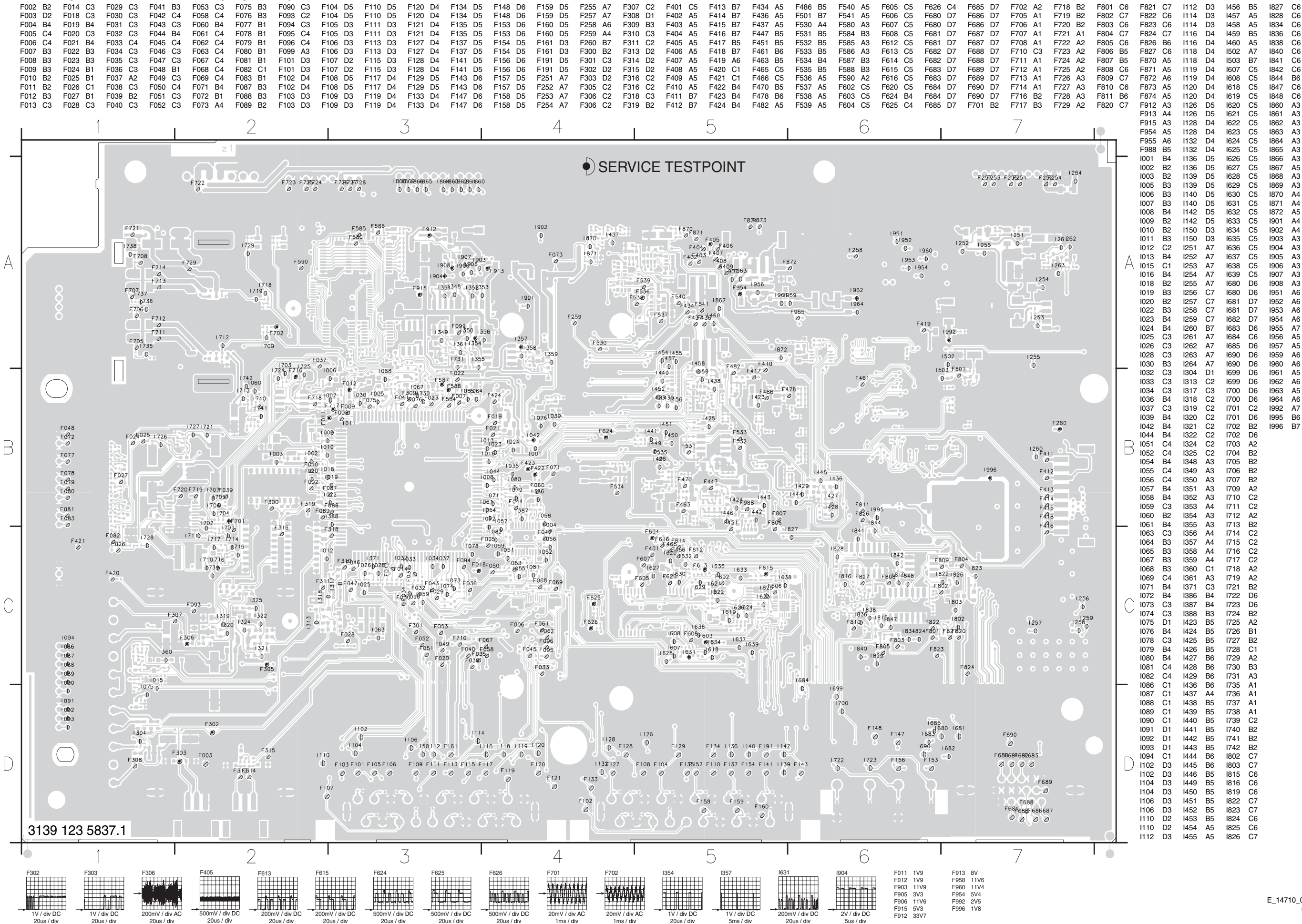
## Wiring Diagram



E\_14720\_002.eps  
300604

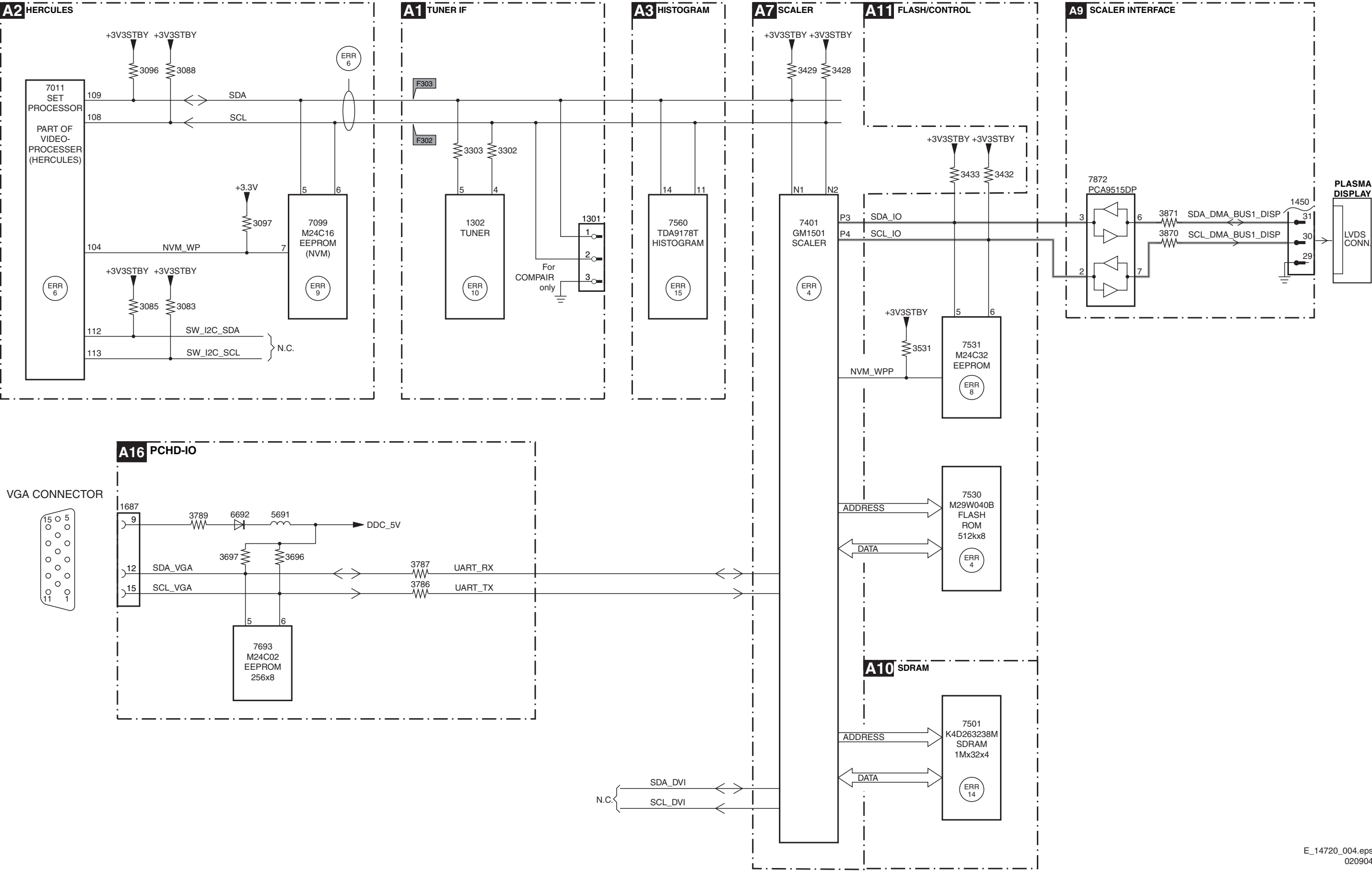
E\_14720\_003.eps  
270804

Testpoint Overview SSB (Top Side)



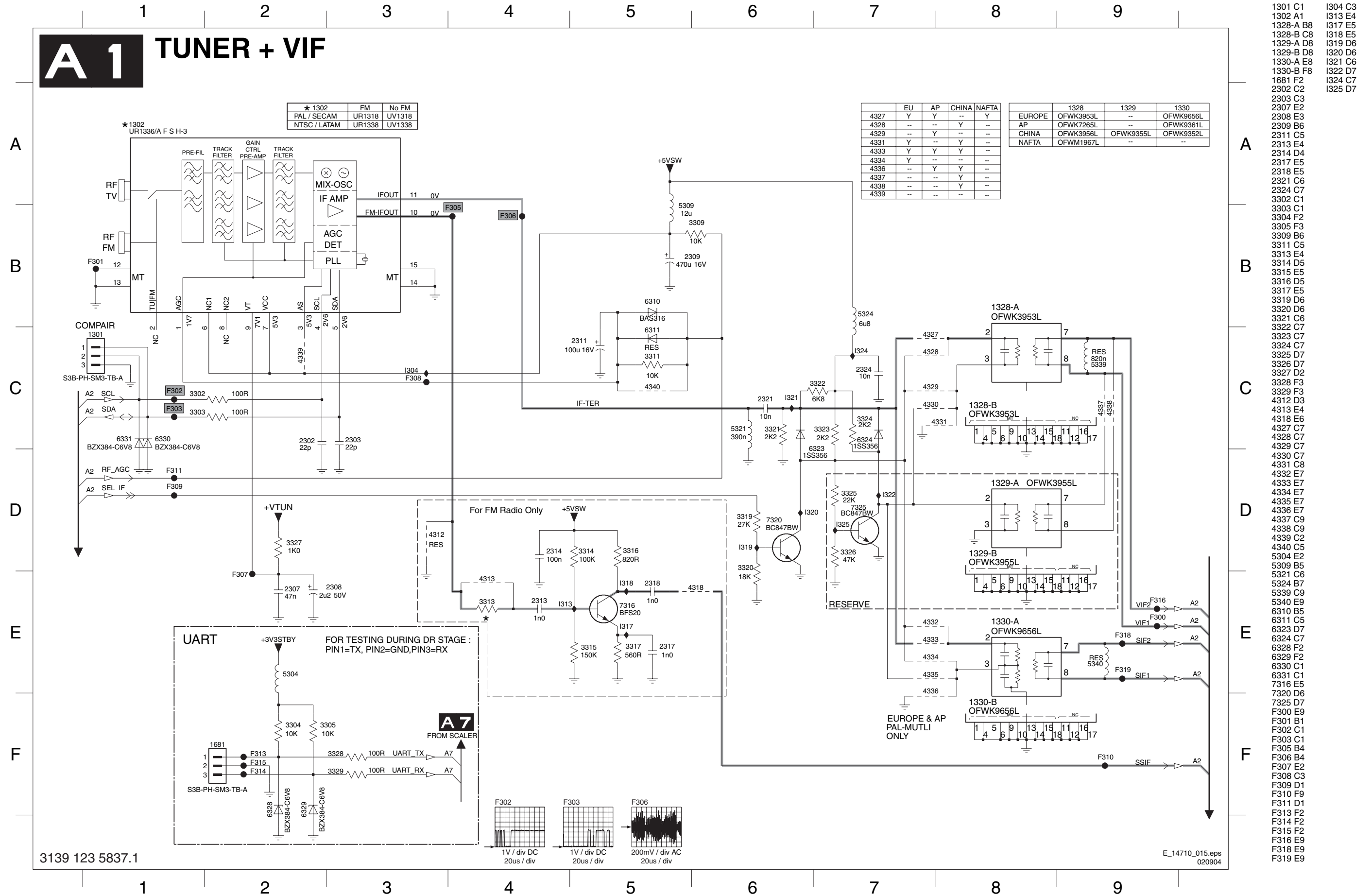
I2C IC Overview

I2C BUS INTERCONNECTION DIAGRAM





## A 1 TUNER + VIF

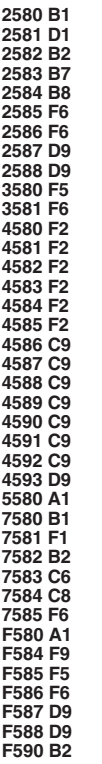




## A3 HISTOGRAM & HERCULES

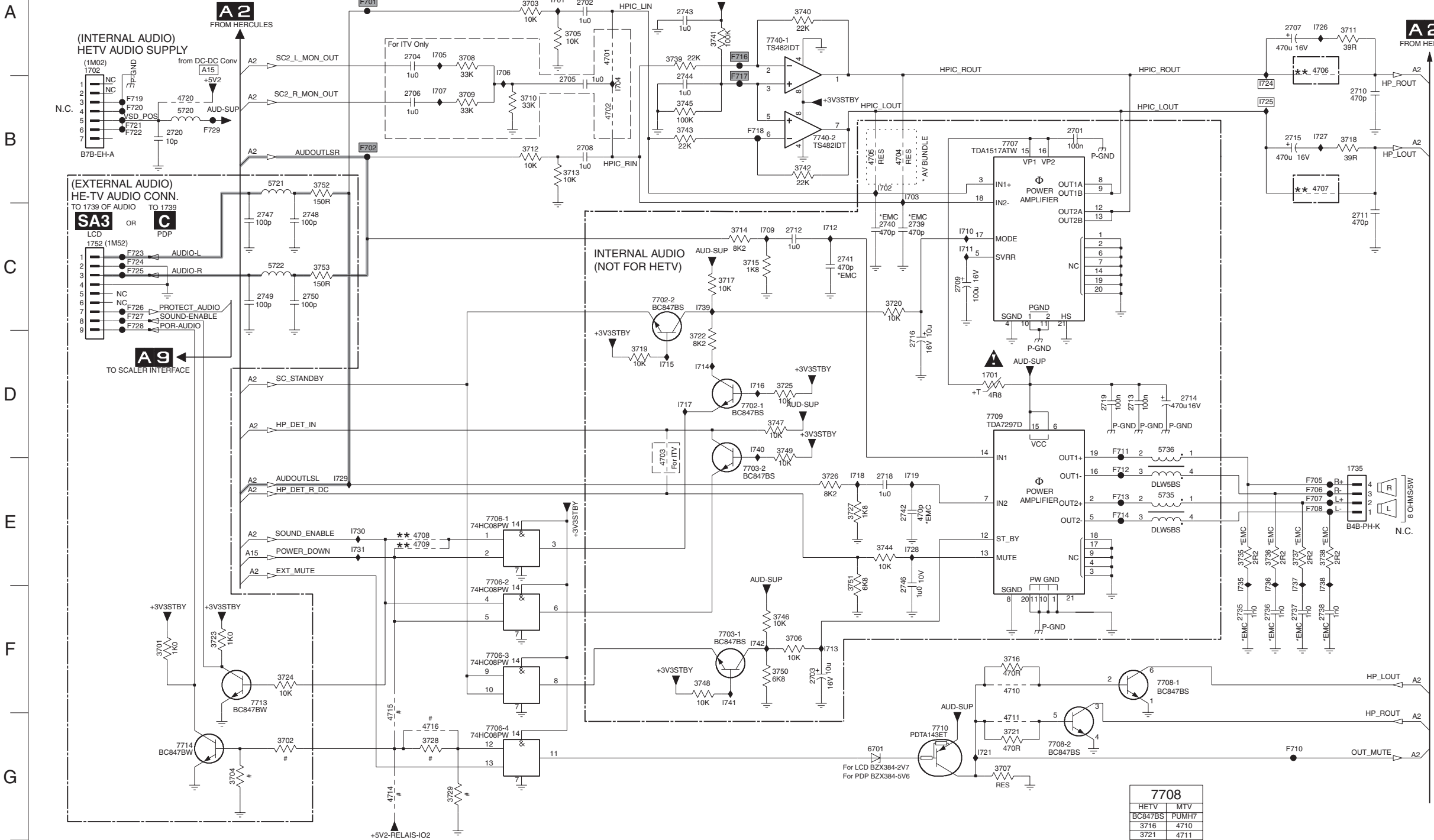


## A 4 AUDIO DELAY LINE (LIPSYNC)



Small Signal Board: Audio Amplifier

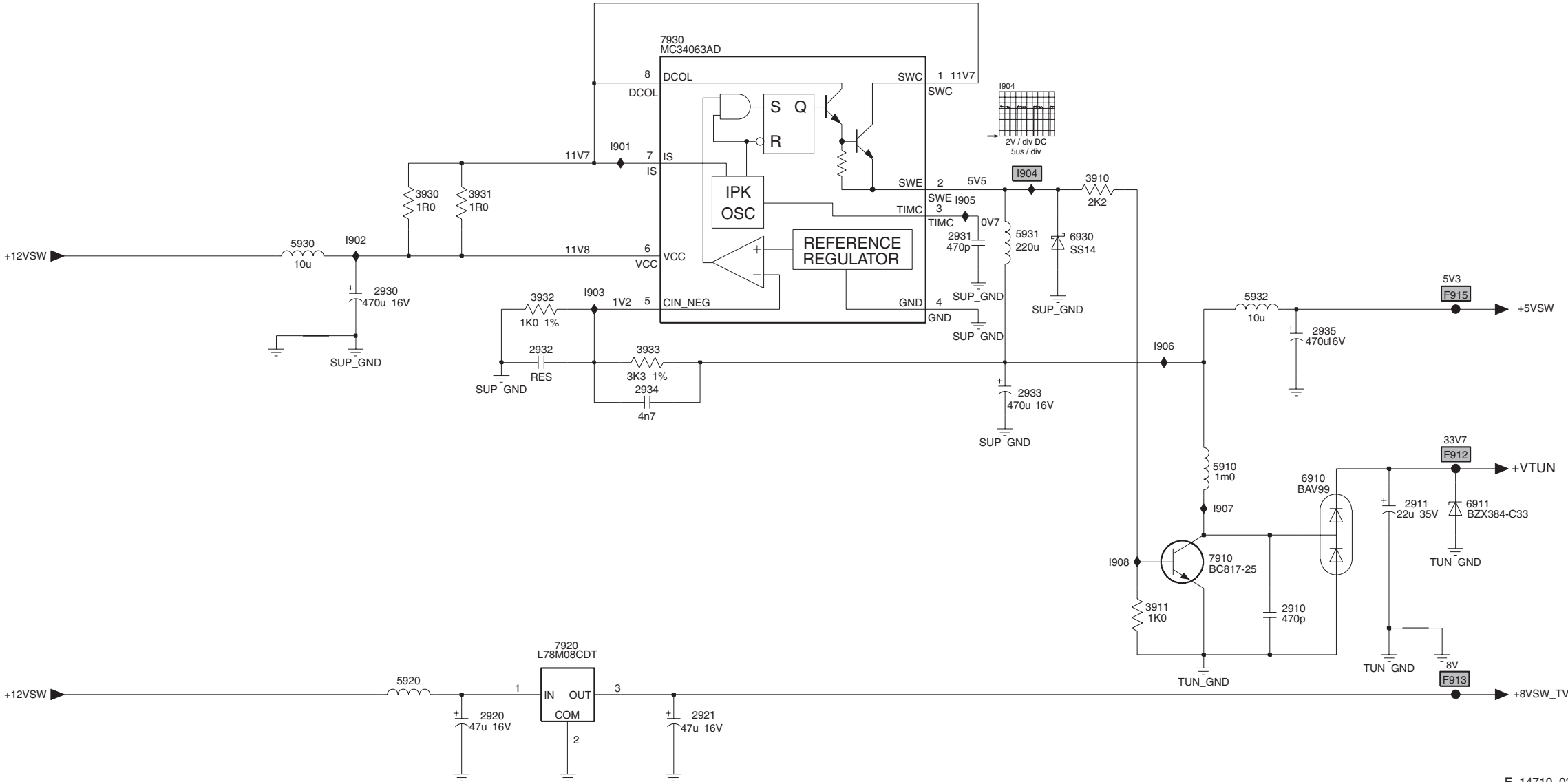
A5 AUDIO AMPLIFIER



- 1701 D8
- 1702 A1
- 1735 E11
- 1752 C1
- 2701 B8
- 2702 A5
- 2703 F6
- 2704 A3
- 2705 B5
- 2706 B3
- 2707 A10
- 2708 B5
- 2709 C8
- 2710 B11
- 2711 C11
- 2712 C6
- 2713 D9
- 2714 D9
- 2715 B10
- 2716 D7
- 2718 E7
- 2719 D9
- 2720 B1
- 2735 F10
- 2736 F10
- 2737 F10
- 2738 F10
- 2739 C7
- 2740 C7
- 2741 C7
- 2742 E7
- 2743 A5
- 2744 B7
- 2745 E7
- 2747 C2
- 2748 C2
- 2749 C2
- 2750 C2
- 3701 F1
- 3702 G2
- 3703 A4
- 3704 G2
- 3705 A5
- 3706 F6
- 3707 G8
- 3708 A4
- 3709 B4
- 3710 B4
- 3711 A11
- 3712 B4
- 3713 B4
- 3714 C6
- 3715 C6
- 3716 F8
- 3717 C6
- 3718 B11
- 3719 D5
- 3720 C7
- 3721 G8
- 3722 D6
- 3723 F2
- 3724 F2
- 3725 D6
- 3726 E7
- 3727 E7
- 3728 G3
- 3729 G4
- 3735 E10
- 3736 E10
- 3737 E10
- 3738 E10
- 3739 A5
- 3740 A6
- 3741 A6
- 3742 B6
- 3743 B5
- 3744 E7
- 3745 B5
- 3746 F6
- 3747 D6
- 3748 F6
- 3749 D6
- 3750 F6
- 3751 F7
- 3752 B3
- 3753 C3
- 4701 A5
- 4702 B5
- 4703 D5
- 4704 B7
- 4705 B7
- 4706 A10
- 4707 B10
- 4708 E3
- 4709 E3
- 4710 F8
- 4711 G8
- 4714 G3
- 4715 F3
- 4716 G3
- 4720 B1
- 5720 B1
- 5721 B2
- 5722 C2
- 5735 E9
- 5736 D9
- 6701 G7
- 7702-1 D6
- 7702-2 C5
- 7703-1 F6
- 7703-2 E6
- 7706-1 E4
- 7706-2 E4
- 7706-3 F4
- 7706-4 G4
- 7707 B8
- 7708-1 F9
- 7708-2 G8

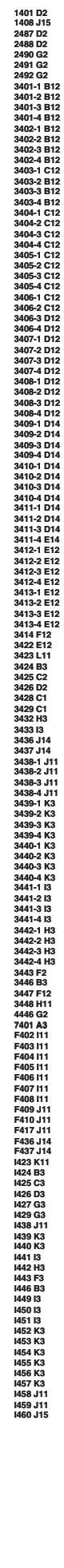
Small Signal Board: TV Supply

A6 TV-SUPPLY



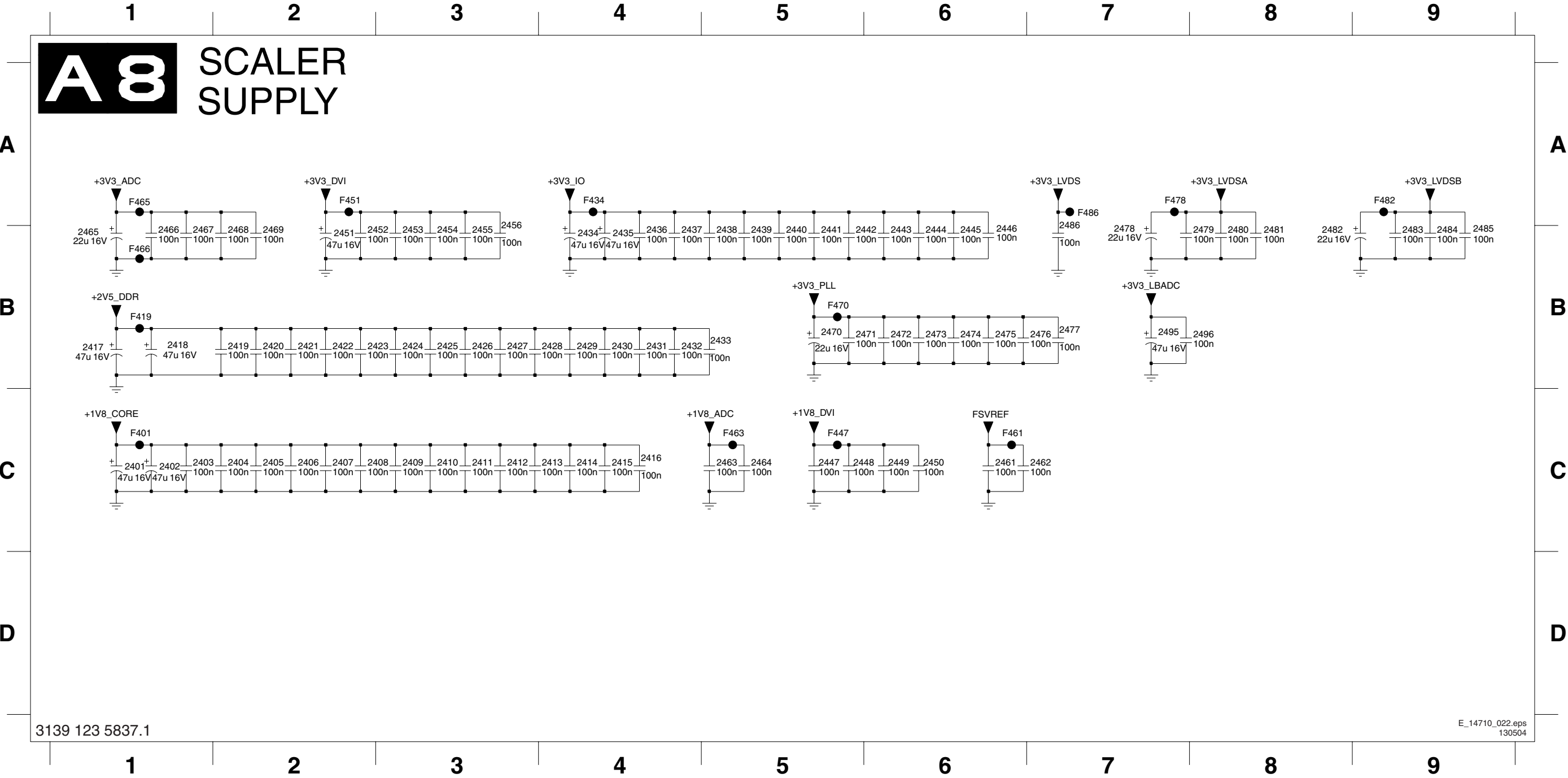
2910 D8  
2911 D9  
2920 E4  
2921 E5  
2930 C3  
2931 B6  
2932 C4  
2933 C7  
2934 C4  
2935 C8  
3910 B7  
3911 D7  
3930 B3  
3931 B4  
3932 C4  
3933 C4  
5910 D8  
5920 E3  
5930 C3  
5931 B7  
5932 C8  
6910 D8  
6911 D9  
6930 C7  
7910 D7  
7920 E4  
7930 A5  
F912 D9  
F913 E9  
F915 C9  
I901 B4  
I902 C3  
I903 C4  
I904 B7  
I905 B6  
I906 C7  
I907 D8  
I908 D7

## A7 SCALER

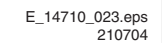


Small Signal Board: Scaler Supply

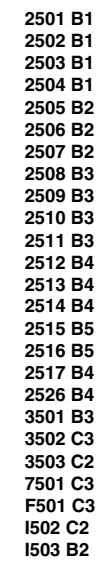
2401 C1	2405 C2	2409 C3	2413 C4	2417 B1	2421 B2	2425 B3	2429 B4	2433 B5	2437 B4	2441 B5	2445 B6	2449 C6	2453 B3	2461 C6	2465 B1	2469 B2	2473 B6	2477 B7	2481 B8	2485 A9	F401 C1	F451 A2	F466 B1	F486 A7
2402 C1	2406 C2	2410 C3	2414 C4	2418 B1	2422 B2	2426 B3	2430 B4	2434 B4	2438 B5	2442 B6	2446 A6	2450 C6	2454 B3	2462 C7	2466 B1	2470 B5	2474 B6	2478 A7	2482 B8	2486 A7	F419 B1	F461 C6	F470 B5	
2403 C1	2407 C2	2411 C3	2415 C4	2419 B2	2423 B3	2427 B3	2431 B4	2435 B4	2439 B5	2443 B6	2447 C5	2451 B2	2455 B3	2463 C5	2467 B1	2471 B6	2475 B6	2479 B8	2483 B9	2495 B7	F434 A4	F463 C5	F478 A7	
2404 C2	2408 C3	2412 C3	2416 C4	2420 B2	2424 B3	2428 B4	2432 B4	2436 B4	2440 B5	2444 B6	2448 C5	2452 B3	2456 A3	2464 C5	2468 B2	2472 B6	2476 B7	2480 B8	2484 B9	2496 B8	F447 C5	F465 A1	F482 A9	



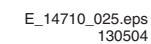
## A9 SCALER INTERFACE



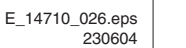
**A 1 Ø** SDRAM



1530 C7  
1532 E4  
2530 A3  
2531 E2  
2532 E4  
2533 A3  
3531 E2  
3532 E4  
3533 E6  
3534 E6  
3536 B7  
3538-1 C5  
3538-2 C5  
3538-3 C5  
3538-4 C5  
3539-1 C5  
3539-2 C5  
3539-3 C5  
3539-4 C5  
3540-1 B6  
3540-2 B6  
3540-3 B6  
3540-4 B6  
3541 D6  
3542 D6  
3543 D7  
3544-1 B5  
3544-2 B5  
3544-3 B5  
3544-4 C5  
3545-1 B5  
3545-2 B5  
3545-3 B5  
3545-4 B5  
3546-1 B5  
3546-2 B5  
3546-3 B5  
3546-4 B5  
3547-1 A5  
3547-2 A5  
3547-3 A6  
3547-4 A6  
3548 A6  
3549 B6  
3550 A6  
3551 B6  
3552 A6  
3553 A6  
5530 A2  
7530 A2  
7531 E3  
7532 E5  
F530 A2  
F531 E2  
F532 E2  
F533 E2  
F534 E4  
F535 E5  
F536 C7  
F537 C6  
F538 C6  
F539 C6  
F540 C7  
F541 C7

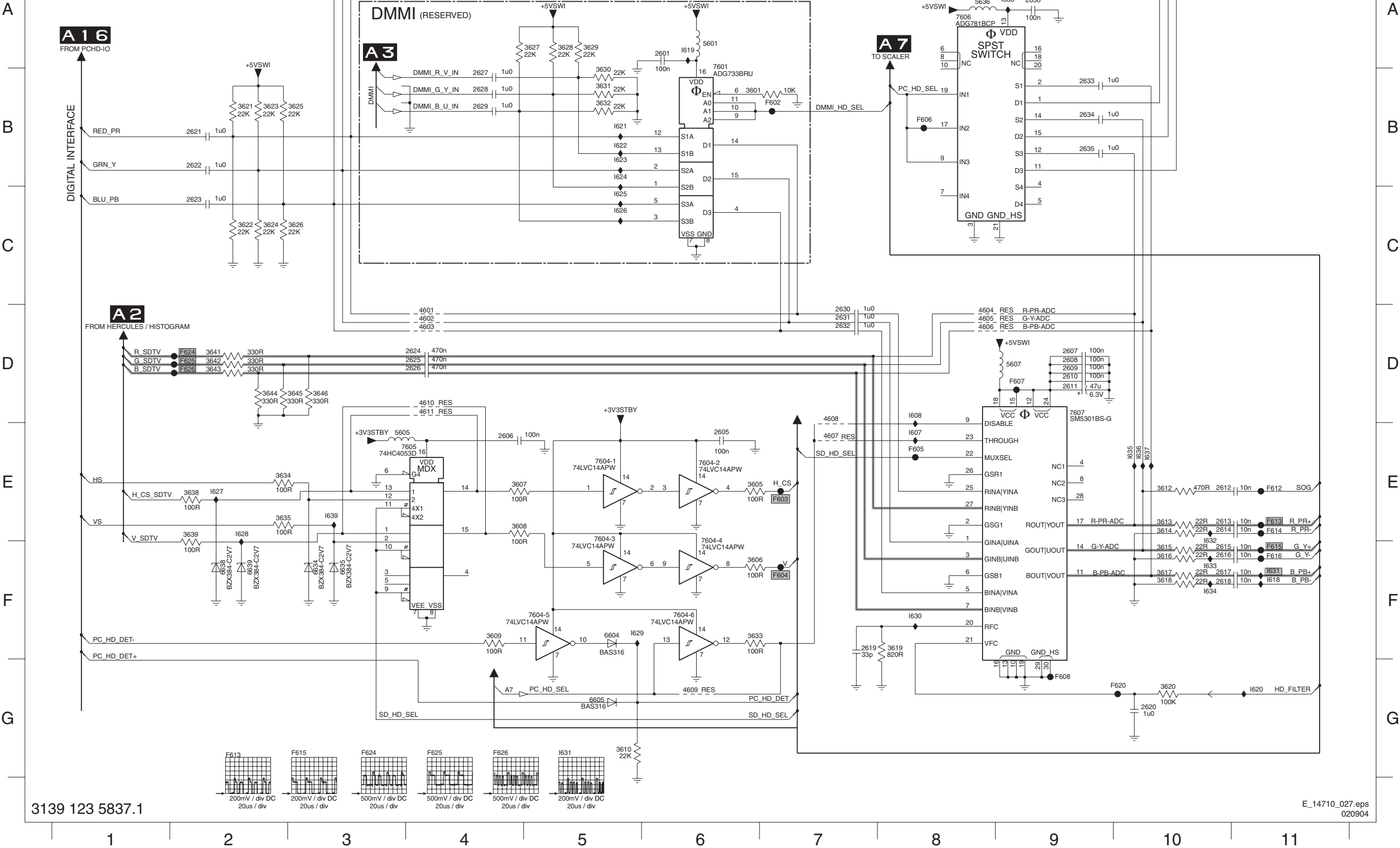


2803A B6	2810 B5	2815 B8	2820 B7	2825 B7	2830 B6	2836 F12	2841 G11	2846 H13	2851 G14	3802-1 B11	3803-2 C11	3804-3 D11	3805-4 D11	3807 H9	3812-3 G9	3817 H12	3824 D4	3829 G14	3834 F4	3839 H15	5803 B7	7807 F3	F802 B5	F807 G2	F820 D2	F826 E12	I816 H11	I825 G5	I836 F13	I844 H12	
2806 B8	2811 B6	2816 B5	2821 C8	2826 B7	2832 D3	2837 G4	2842 G13	2847 F13	3801-1 B11	3802-2 B11	3803-3 C11	3804-4 D11	3806-1 E11	3808 B2	3813-3 G9	3817 H13	3825 D4	3829 G14	3835 C5	4836 H14	5804 B6	7808 D5	F803 B7	F808 I7	F821 D2	F827 F12	I819 H13	I828 G5	I838 F13	I848 H12	
2807 B6	2812 B3	2817 B6	2822 B5	2827 C8	2833 E11	2838 G4	2843 H12	2848 F13	3801-2 B11	3802-3 C11	3803-4 C11	3805-1 D11	3806-2 E11	3809 B3	3813-4 G9	3821 D5	3826 E12	3831 G4	3836 F14	4838 G14	5805 B7	7809 F11	F804 B6	F809 B3	F822 D2	I802 D2	I822 E4	I827 H14	I840 G4	I848 F13	
2808 B8	2813 B7	2818 B6	2823 C5	2828 B5	2834 E11	2839 G4	2844 H12	2849 D2	3801-3 B11	3802-4 C11	3804-1 C11	3805-2 D11	3806-3 E11	3810 B3	3815 H11	3822 D4	3827 E12	3832 D2	3837 H14	5801 B6	7801 B2	F805 B7	F810 G10	F823 I2	I803 D3	I823 E4	I828 H14	I841 G11			
2809 B7	2814 B7	2819 B7	2824 B6	2829 C6	2835 F11	2840 G4	2845 H11	2850 G14	3801-4 B11	3803-1 C11	3804-2 D11	3805-3 D11	3806-4 E11	3813-1 G9	3816 H11	3823 D4	3828 D2	3833 G15	3838 F14	5802 B5	7806 E4	F801 B6	F806 G2	F811 F13	F824 D2	I805 H11	I824 G5	I834 F5	I842 H12		



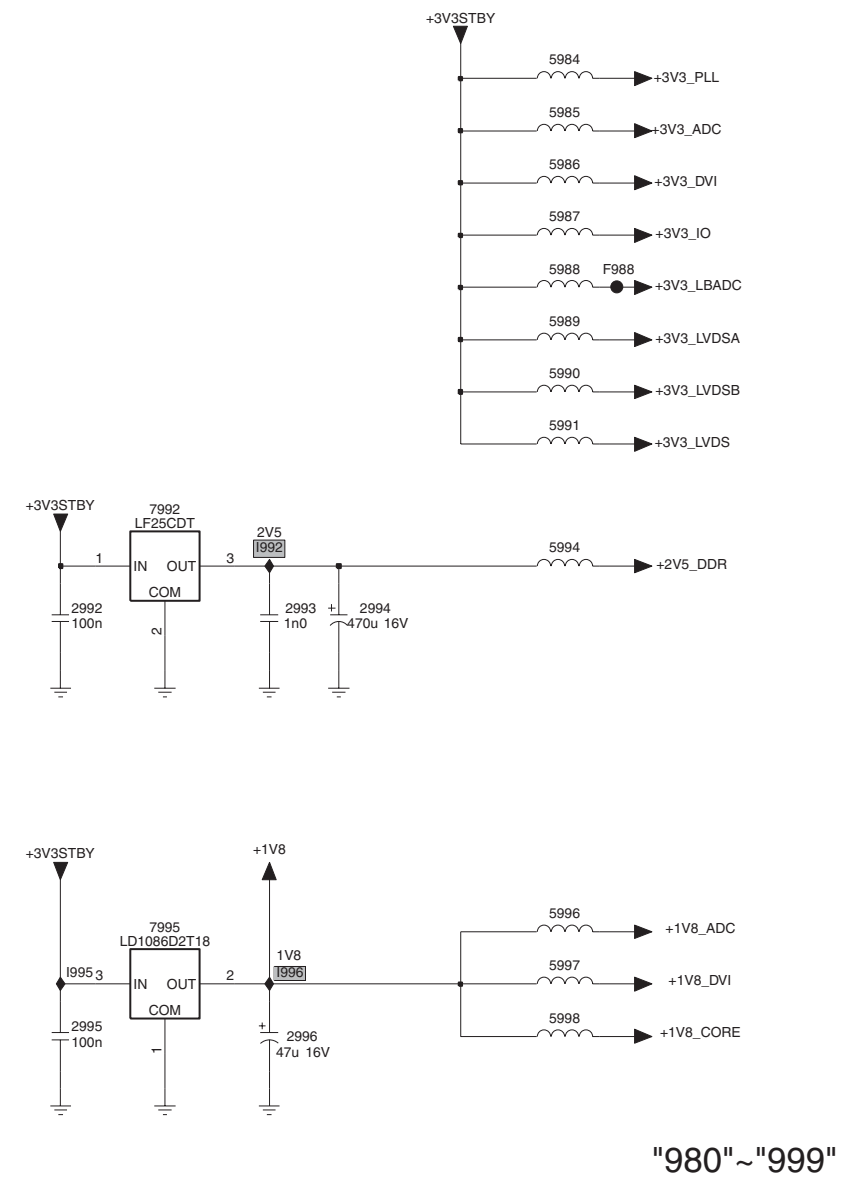
Small Signal Board: PCHD MUX

A13 PCHD-MUX



2601 A6	7601 B6
2605 E6	7604-1 E5
2606 E4	7604-2 E6
2607 D9	7604-3 F5
2608 D9	7604-4 F6
2609 D9	7604-5 F5
2610 D9	7604-6 F6
2611 D9	7605 E4
2612 E10	7606 A8
2613 E10	7607 D9
2614 E10	F602 B7
2615 F10	F603 E7
2616 F10	F604 F7
2617 F10	F605 E8
2618 F10	F606 B8
2619 F7	F607 D9
2620 G10	F608 G9
2621 B2	F612 E11
2622 B2	F613 E11
2623 C2	F614 E11
2624 D4	F615 F11
2625 D4	F616 F11
2626 D4	F620 G10
2627 B4	F624 D2
2628 B4	F625 D2
2629 B4	F626 D2
2630 D7	I607 E8
2631 D7	I608 D8
2632 D7	I618 F11
2633 B9	I619 A6
2634 B9	I620 G11
2635 B9	I621 B5
2636 A9	I622 B5
3601 B6	I623 B5
3605 E6	I624 B5
3606 F6	I625 C5
3607 E4	I626 C5
3608 E4	I627 E2
3609 F4	I628 E2
3610 G5	I629 F5
3612 E10	I630 F8
3613 F10	I631 F11
3614 E10	I632 E10
3615 F10	I633 F10
3616 F10	I634 F10
3617 F10	I635 E10
3618 F10	I636 E10
3619 F8	I637 E10
3620 G10	I638 A9
3621 B2	I639 E3
3622 B2	
3623 B2	
3624 C2	
3625 B3	
3626 C3	
3627 A5	
3628 A5	
3629 A5	
3630 A5	
3631 B5	
3632 B5	
3633 F6	
3634 E2	
3635 E2	
3636 E2	
3637 E2	
3638 E2	
3639 E2	
3640 E2	
3641 D2	
3642 D2	
3643 D2	
3644 D2	
3645 D3	
3646 D3	
4601 D4	
4602 D4	
4603 D4	
4604 D8	
4605 D8	
4606 D8	
4607 E7	
4608 D7	
4609 G6	
4610 D4	
4611 D4	
5601 A6	
5605 E3	
5607 D9	
5636 A8	
6604 F5	
6605 G5	
6634 F3	
6635 F3	
6638 F2	
6639 F2	

**A 14** SUPPLY

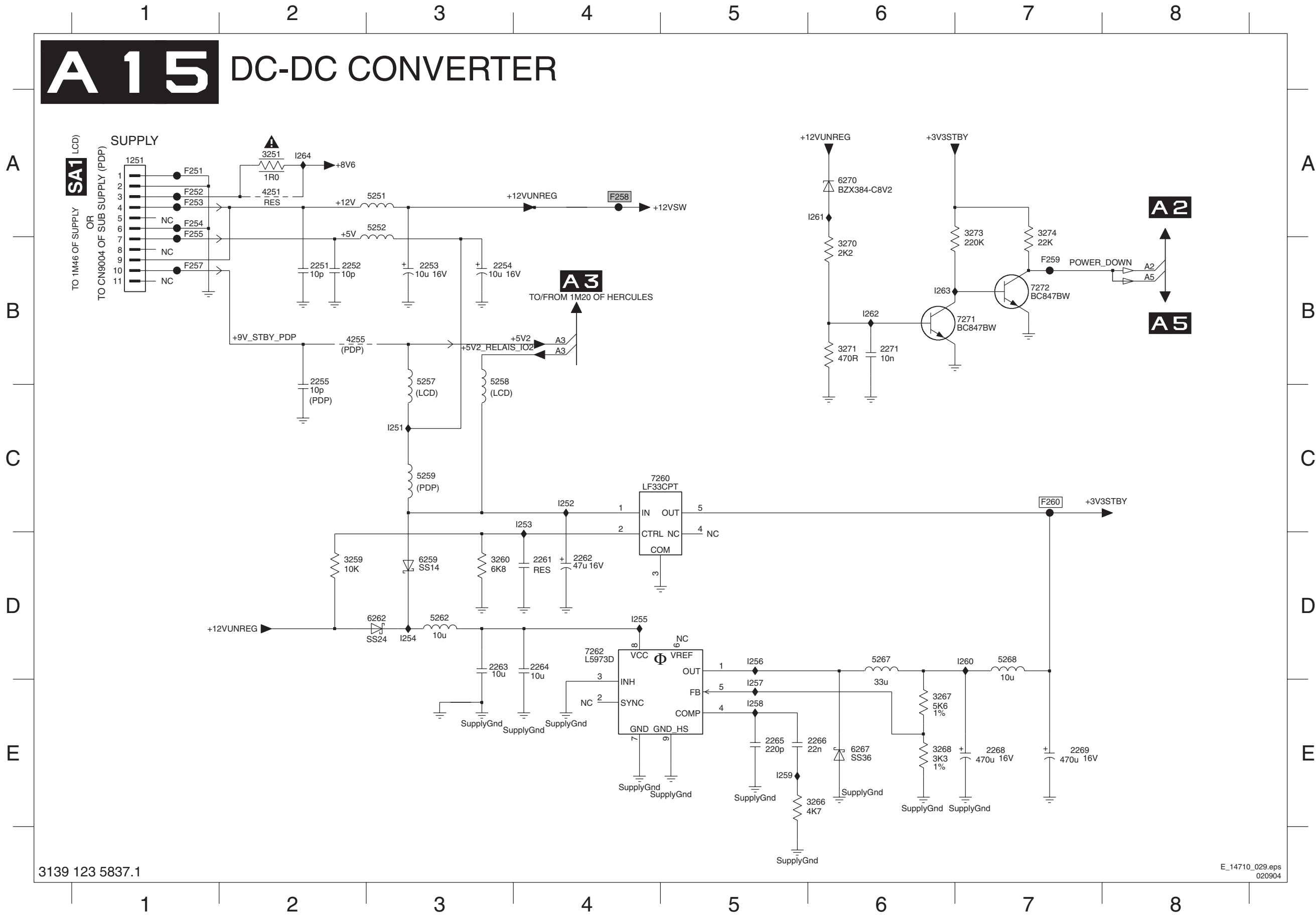


ITEM	13"	≥15"
2959	---	100N
3958	1K	15K
5954	---	YES
5955	YES	---
5956	---	YES
5957	YES	---
7953	---	L4940D2T1

E\_14710\_028.eps  
020904

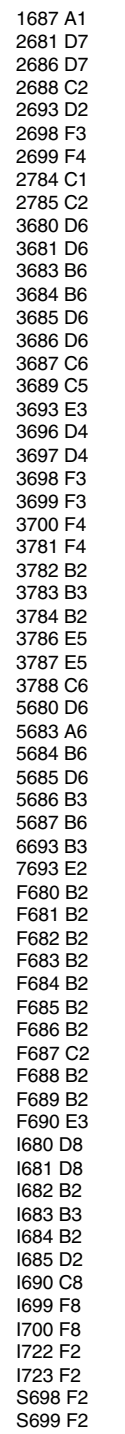
Small Signal Board: DC-DC Converter

A 15 DC-DC CONVERTER

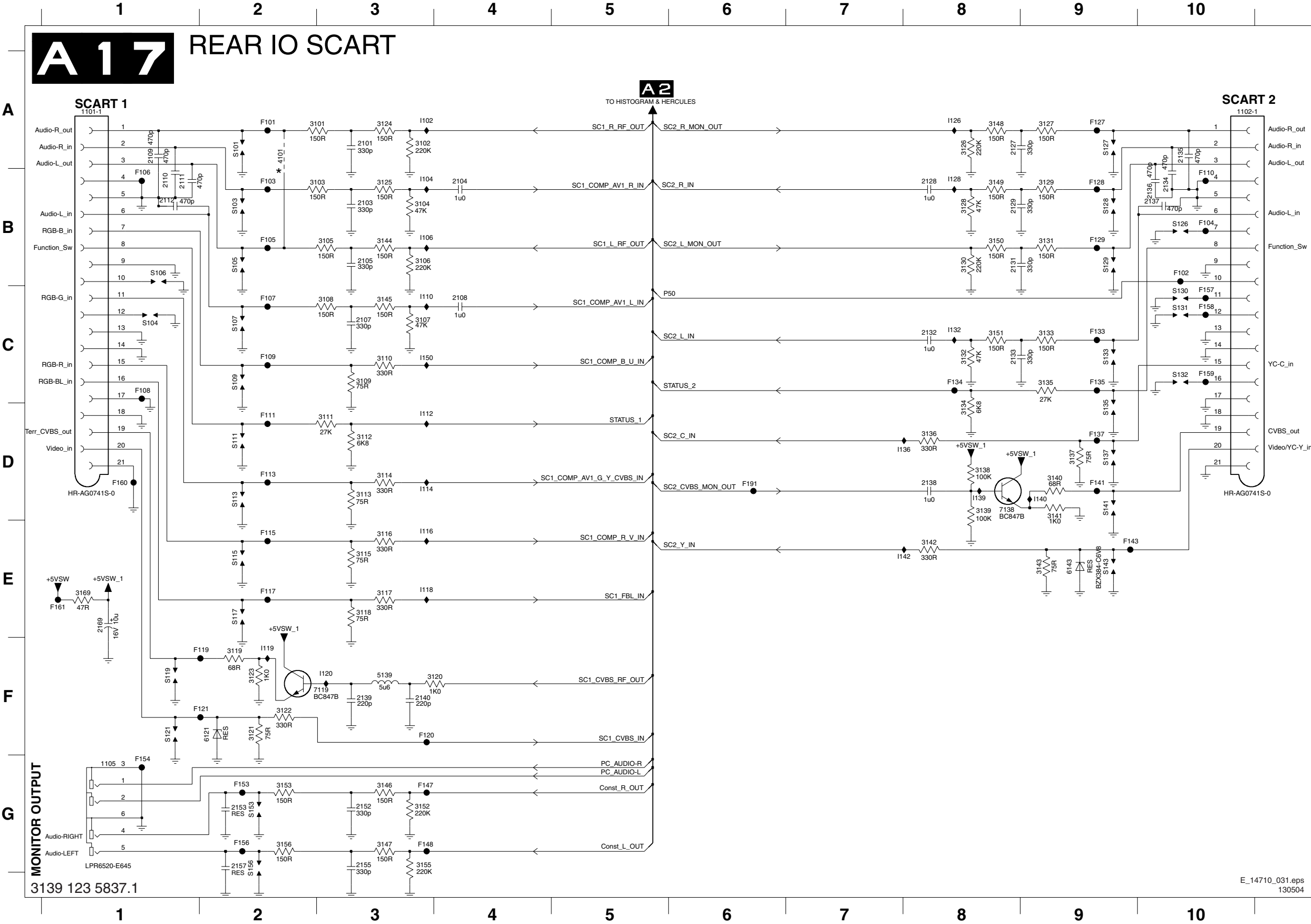


- 1251 A1
- 2251 B2
- 2252 B2
- 2253 B3
- 2254 B3
- 2255 B2
- 2261 D4
- 2262 D4
- 2263 D3
- 2264 D4
- 2265 E5
- 2266 E5
- 2268 E7
- 2269 E7
- 2271 B6
- 3251 A2
- 3259 D2
- 3260 D3
- 3266 E5
- 3267 E6
- 3268 E6
- 3270 B6
- 3271 B6
- 3273 A7
- 3274 A7
- 4251 A2
- 4255 B2
- 5251 A3
- 5252 A3
- 5257 B3
- 5258 B3
- 5259 C3
- 5262 D3
- 5267 D6
- 5268 D7
- 6259 D3
- 6262 D3
- 6267 E6
- 6270 A6
- 7260 C4
- 7262 D4
- 7271 B7
- 7272 B7
- F251 A1
- F252 A1
- F253 A1
- F254 A1
- F255 A1
- F257 B1
- F258 A4
- F259 B7
- F260 C7
- I251 C3
- I252 C4
- I253 C4
- I254 D3
- I255 D4
- I256 D5
- I257 E5
- I258 E5
- I259 E5
- I260 D7
- I261 A6
- I262 B6
- I263 B6
- I264 A2

**A 16** PCHD-IO

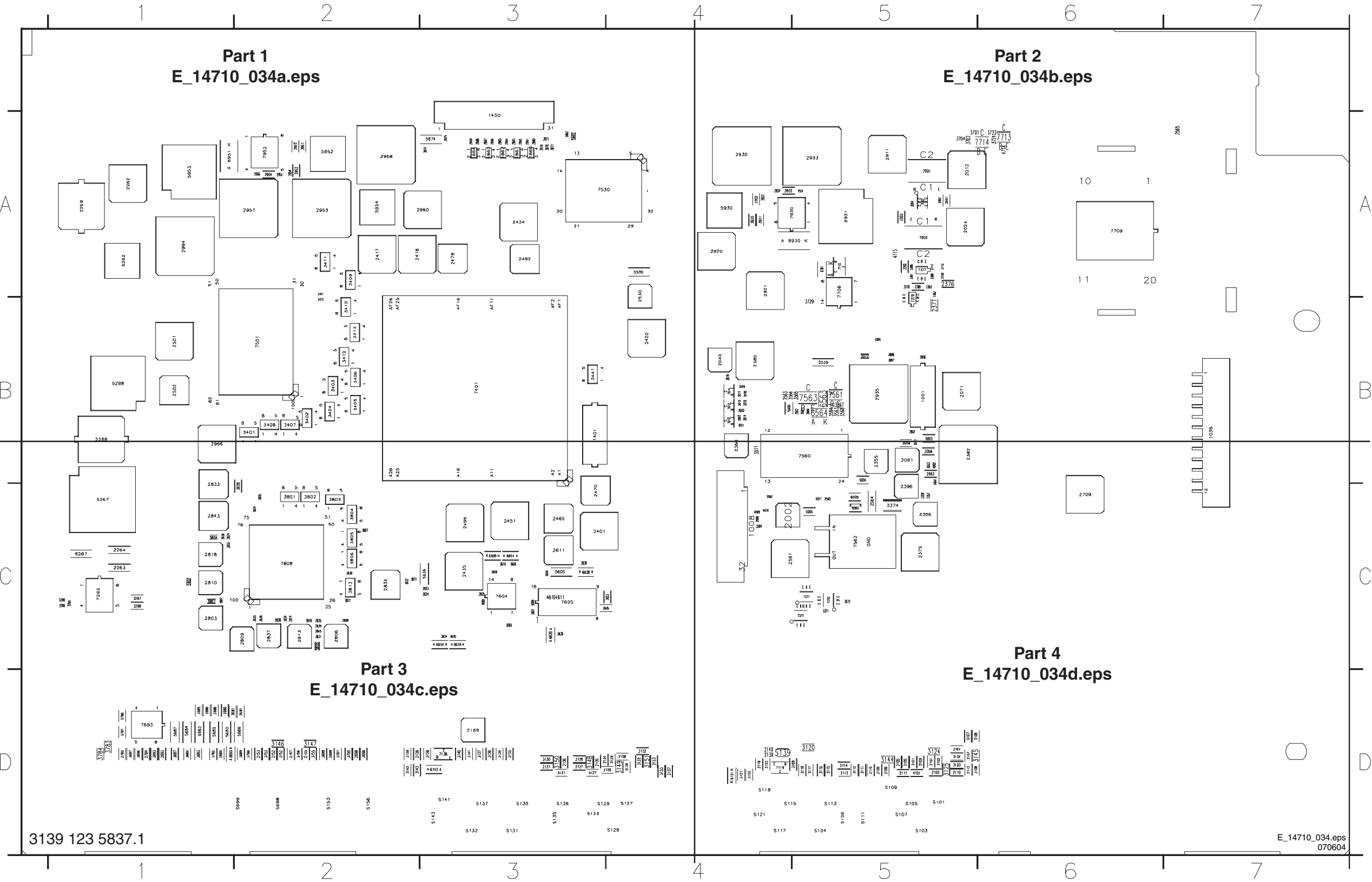


Small Signal Board: Rear IO Scart



Layout Small Signal Panel (Top Side Overview)

1001	B5	2027	C5	2127	D3	2169	D3	2386	A5	2530	A4	2699	D2	2825	C2	2867	A3	2953	A2	3016	B4	3105	D5	3122	D4	3139	D2	3169	D5	3403	B2	3563	B5	3635	C3	3701	A5	3803	C2	3931	A4	5004	B5	5687	D1	6564	B5	7119	D4	7693	D1
1008	C4	2035	B5	2128	D4	2262	A1	2392	A5	2560	C5	2708	A5	2826	C2	2868	A3	2954	A2	3017	B4	3106	D5	3123	D4	3140	D3	3266	C1	3404	B2	3564	B5	3638	C3	3702	A5	3804	C2	3932	A4	5005	C5	5801	C1	6604	C3	7138	D3	7706	A5
1036	B7	2040	B4	2129	D4	2263	C1	2396	C5	2561	C4	2709	C6	2830	C1	2869	A3	2955	A2	3018	B4	3107	D5	3124	D5	3141	D3	3267	C1	3405	B2	3565	B5	3639	C3	3704	A5	3805	C2	3933	A4	5006	B4	5802	C1	6605	C3	7262	C1	7709	A6
1401	B3	2061	B5	2131	D3	2264	C1	2401	C3	2562	C4	2784	D1	2833	C1	2870	A3	2956	A2	3019	B4	3108	D5	3125	D5	3142	D2	3268	C1	3406	B2	3566	B4	3680	D1	3712	A5	3806	C2	3951	A2	5072	B5	5804	C1	6634	C3	7370	C5	7710	A5
1450	A3	2063	B5	2132	D4	2265	C1	2402	B4	2563	B4	2785	D1	2834	C2	2871	A3	2957	A2	3049	B4	3109	D5	3126	D3	3143	D2	3359	C5	3407	B2	3567	B5	3681	D1	3713	A5	3807	C2	3952	A2	5139	D4	5805	C2	6635	C3	7371	C5	7713	A6
1860	A3	2071	B5	2133	D4	2266	C1	2417	A2	2564	C5	2803	C1	2837	C2	2874	A3	2958	A2	3050	B4	3110	D5	3127	D3	3144	D5	3364	C4	3408	B2	3568	B5	3683	D1	3723	A6	3813	C2	3953	A2	5262	A1	5874	A3	6638	C3	7372	C5	7714	A6
1861	A3	2089	C4	2134	D3	2268	B1	2418	A2	2565	A7	2806	C2	2838	C2	2875	A3	2960	A3	3051	B4	3111	D5	3128	D4	3145	D5	3371	C5	3409	A2	3605	C3	3684	D1	3724	A6	3821	C2	3954	A2	5267	C1	5882	A3	6639	C3	7376	B5	7808	C2
1862	A3	2101	D5	2135	D3	2269	A1	2434	A3	2605	C3	2807	C1	2839	C2	2882	A3	2994	A1	3052	B4	3112	D5	3129	D4	3146	D2	3372	C5	3410	B2	3606	C3	3685	D1	3729	B5	3824	C2	4009	C4	5268	B1	5930	A4	6693	D1	7377	A5	7930	A4
1863	A3	2103	D5	2136	D3	2355	B5	2435	C3	2606	C3	2808	C2	2840	C2	2911	A5	2996	B1	3053	B5	3113	D5	3130	D3	3147	D2	3374	C5	3411	A2	3607	C3	3686	D1	3781	D2	3825	C2	4010	C4	5530	A4	5931	A5	6701	A5	7401	B3	7952	A2
1864	A3	2104	D5	2137	D4	2356	C5	2451	C3	2611	C3	2809	C2	2843	C1	2920	A4	3001	A5	3060	B5	3114	D5	3131	D3	3148	D3	3378	A5	3412	B2	3608	C3	3687	D1	3782	D1	3826	C2	4062	B5	5560	C5	5952	A2	6930	A5	7501	B2		
2002	C4	2105	D5	2138	D2	2357	C5	2465	C3	2625	C4	2810	C1	2860	A3	2921	A4	3002	A5	3085	B5	3115	D5	3132	D4	3149	D4	3380	A5	3413	B2	3609	C3	3689	D2	3783	D1	3830	C2	4101	D5	5605	C3	5953	A1	6951	A1	7530	A3		
2006	B5	2107	D5	2139	D4	2360	B4	2470	C3	2626	C4	2813	C2	2861	A3	2930	A4	3003	A5	3086	B5	3116	D5	3133	D4	3150	D3	3381	A5	3414	B2	3610	C3	3693	D1	3784	D1	3831	C2	4609	C3	5636	C3	5954	A2	7001	A5	7560	B5		
2007	B5	2108	D5	2140	D4	2375	C5	2478	A3	2681	D2	2814	C2	2862	A3	2931	A5	3004	A5	3087	B5	3117	D5	3134	D3	3151	D4	3382	A5	3441	B3	3621	C2	3696	D1	3786	D1	3834	C2	4610	C3	5680	D1	6005	C5	7002	A5	7561	B5		
2008	B5	2109	D5	2152	D2	2376	A5	2482	A3	2686	D1	2818	C1	2863	A3	2932	A4	3007	B5	3101	D5	3118	D5	3135	D3	3152	D2	3383	A5	3447	A2	3622	C2	3697	D1	3787	D1	3835	C1	4611	C3	5683	D1	6121	D4	7003	A5	7562	C5		
2009	B5	2110	D5	2153	D2	2377	B5	2495	C3	2688	D1	2819	C2	2864	A3	2933	A5	3011	B4	3102	D5	3119	D4	3136	D3	3153	D2	3386	A5	3560	B5	3623	C3	3698	D2	3788	D2	3870	A3	4714	A6	5684	D1	6143	D3	7012	B4	7563	B5		
2012	A5	2111	D5	2155	D2	2380	B4	2501	B1	2693	D1	2820	C2	2865	A3	2934	A4	3014	B4	3103	D5	3120	D5	3137	D3	3155	D2	3401	B2	3561	B5	3624	C3	3699	D2	3801	C2	3871	A3	4715	A5	5685	D1	6267	C1	7013	B4	7604	C3		
2024	A5	2112	D5	2157	D2	2382	B5	2502	B1	2698	D2	2824	C1	2866	A3	2935	B5	3015	B4	3104	D5	3121	D4	3138	D3	3156	D2	3402	B2	3562	B5	3634	C3	3700	D2	3802	C2	3930	A4	5003	B5	5686	D2	6563	B5	7014	B4	7605	C3		





## 7

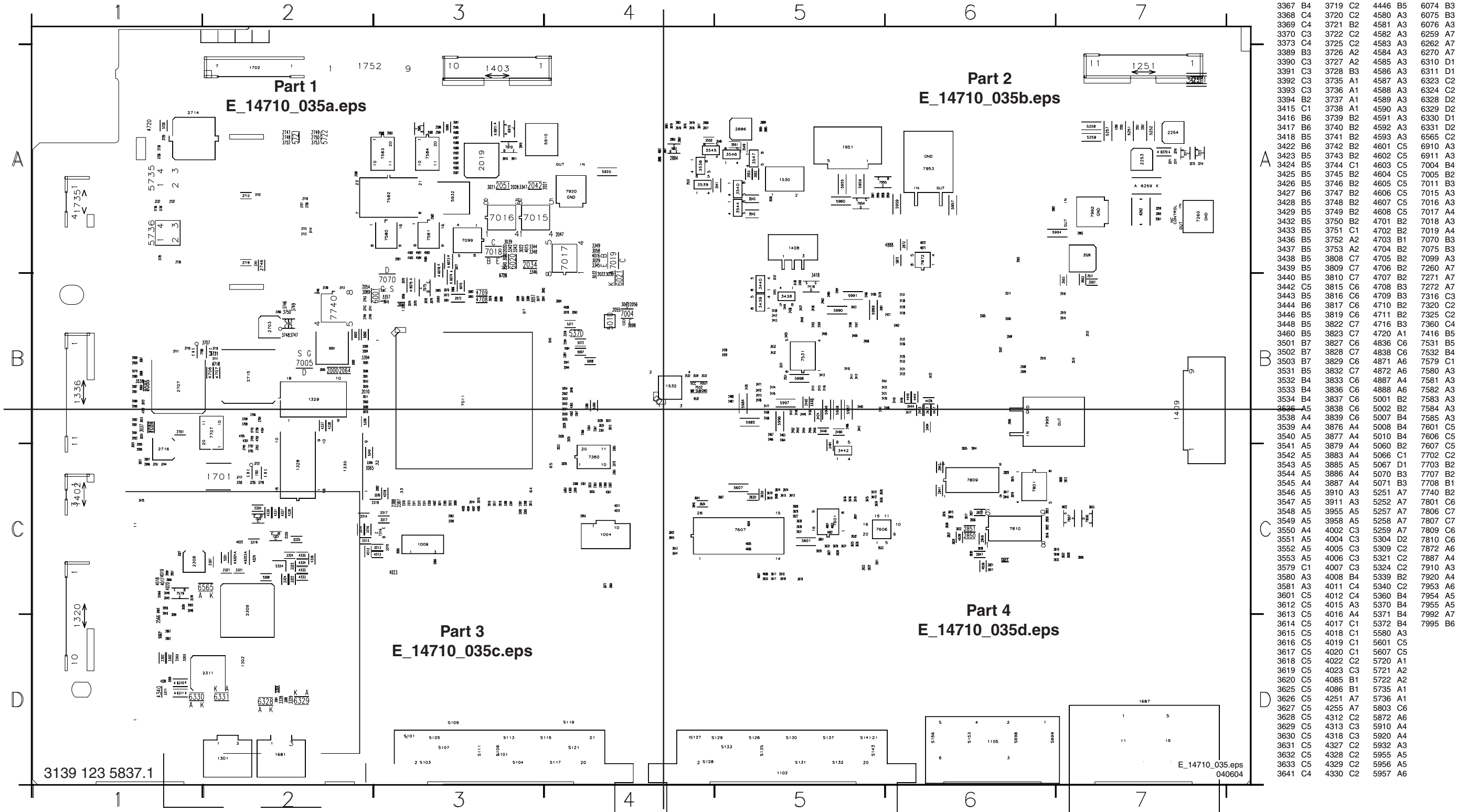
## Part 2







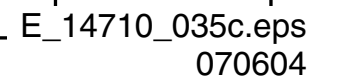
1009	C4	2005	B2	2029	B4	2050	C1	2069	B1	2088	B1	2271	A7	2364	B6	2398	C3	2421	B5	2440	B5	2462	B6	2483	B5	2508	B6	2582	A3	2617	C5	2636	C5	2720	A1	2812	C7	2846	C6	2887	A4	3021	A3	3038	B1	3070	B3	3092	B3	3309	D1	3329	D2	3642	C4	4331	C2	5565	A6
1004	C3	2020	B4	2030	B4	2051	A3	2070	B3	2090	B1	2302	D1	2365	C4	2403	B5	2422	B5	2441	B5	2463	B5	2484	B5	2509	B6	2583	A3	2618	C5	2701	B1	2735	A1	2815	C6	2847	C6	2889	A5	3022	A3	3039	A3	3071	C4	3093	B4	3311	D1	3340	A3	3643	C4	4332	C2	5560	A5
1301	D2	2011	B2	2031	B4	2052	B4	2072	B3	2091	B1	2303	D1	2366	B4	2404	B5	2423	B6	2442	B5	2464	B5	2485	B5	2510	B6	2584	A3	2619	C5	2702	C2	2736	A1	2816	C6	2848	C6	2890	A3	3023	B1	3040	B4	3342	A3	3644	C4	4333	C2	5584	B5						
1328	C2	2013	C3	2032	B4	2053	C4	2073	B3	2092	B1	2307	C2	2367	B4	2405	B5	2424	B6	2443	B5	2466	B5	2486	B5	2511	B6	2585	A3	2620	C5	2703	B2	2737	A1	2817	C6	2849	C7	2895	A6	3024	B1	3048	B4	3073	B3	3096	B3	3314	C2	3343	A3	3645	C4	4334	C2	5585	B5
1329	B2	2014	C3	2033	B4	2054	B2	2074	B3	2093	B1	2308	C1	2368	C4	2406	B5	2425	B6	2444	B5	2467	B5	2487	B5	2512	B7	2586	A3	2621	C5	2704	B2	2738	A1	2821	C6	2850	C6	2961	A5	3025	C1	3054	B4	3074	C3	3097	B3	3315	C2	3344	A3	3646	C4	4335	C2	5586	B5
1330	C2	2015	C3	2034	A3	2055	B4	2076	B3	2094	B1	2309	C2	2370	C3	2407	B5	2426	B6	2445	B5	2468	B5	2488	B5	2513	B7	2587	A3	2622	C5	2705	B2	2739	B2	2822	C6	2851	C6	2962	A6	3026	C1	3055	C4	3075	B3	3098	B4	3316	C2	3345	A4	3703	C2	4336	C2	5587	B5
1408	A5	2016	C3	2036	B1	2056	B4	2077	B3	2095	C1	2311	D2	2371	C3	2408	B5	2427	B6	2446	B6	2469	B5	2490	B5	2514	B7	2588	A3	2623	C5	2706	B2	2740	C2	2823	C6	2872	A6	2993	A7	3027	C1	3056	B3	3077	A3	3251	A7	3317	C3	3346	A3	3705	C2	4337	B2	5588	B5
1409	B7	2017	C3	2037	B1	2057	C1	2078	B4	2096	C1	2313	C2	2372	C3	2409	B5	2428	B6	2447	B5	2471	B5	2491	C5	2515	B7	2601	C5	2624	C4	2707	B1	2741	A2	2827	C6	2876	A4	2995	B6	3028	C4	3058	B3	3078	B3	3259	A7	3319	C2	3347	A3	3706	B2	4338	B2	5589	B5
1530	A5	2018	C3	2041	B4	2058	C1	2079	B1	2097	C1	2314	C2	2373	C3	2410	B5	2429	B6	2448	B5	2472	B5	2492	B5	2516	B7	2607	C5	2627	C5	2710	B1	2742	A2	2828	C6	2877	A4	3000	B2	3029	A4	3057	B4	3079	B3	3260	A7	3320	C2	3348	A3	3707	B2	4339	D1	5590	B5
1532	B4	2019	A3	2042	A3	2059																																																					



[illegible]

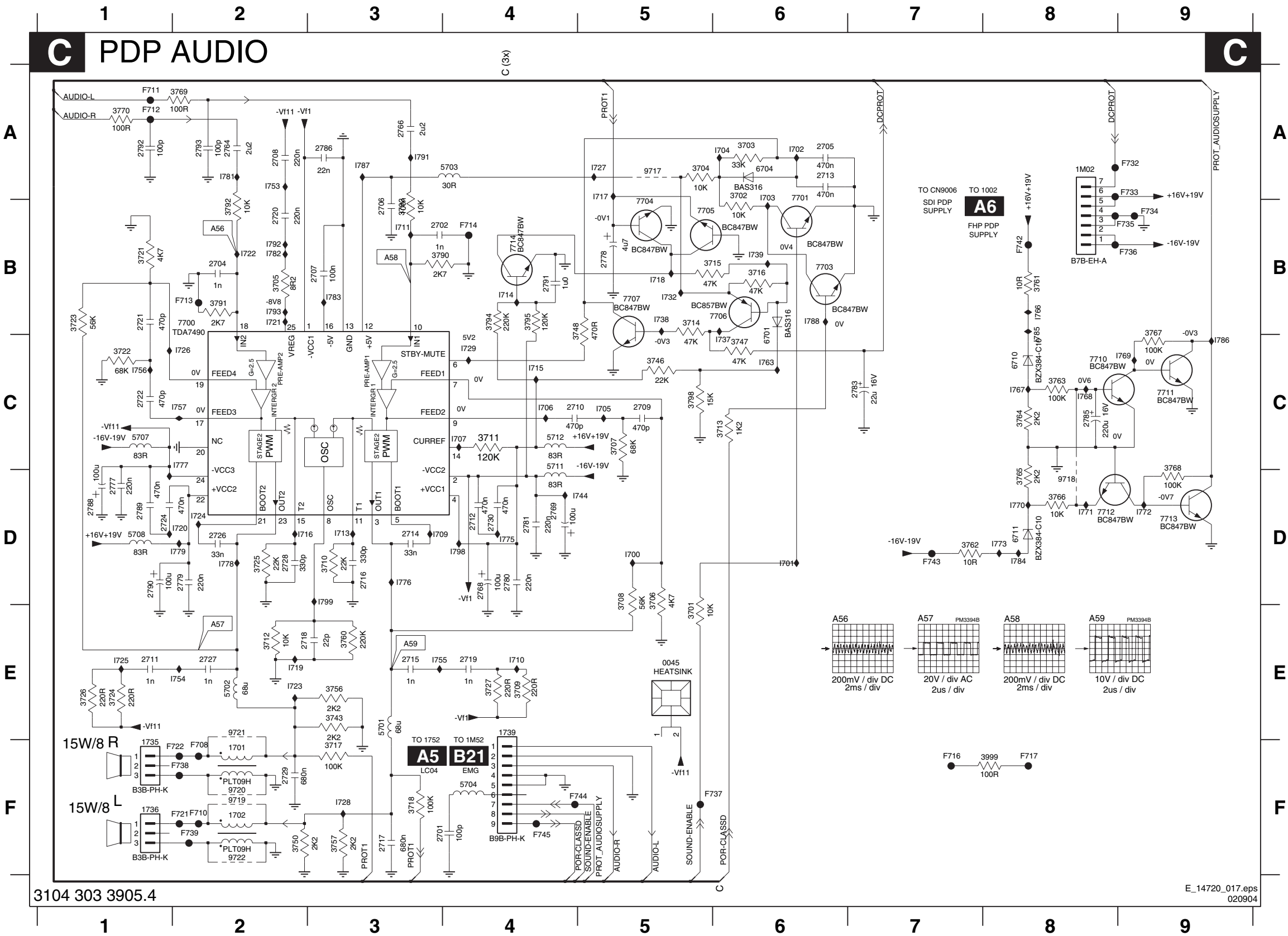
## 7







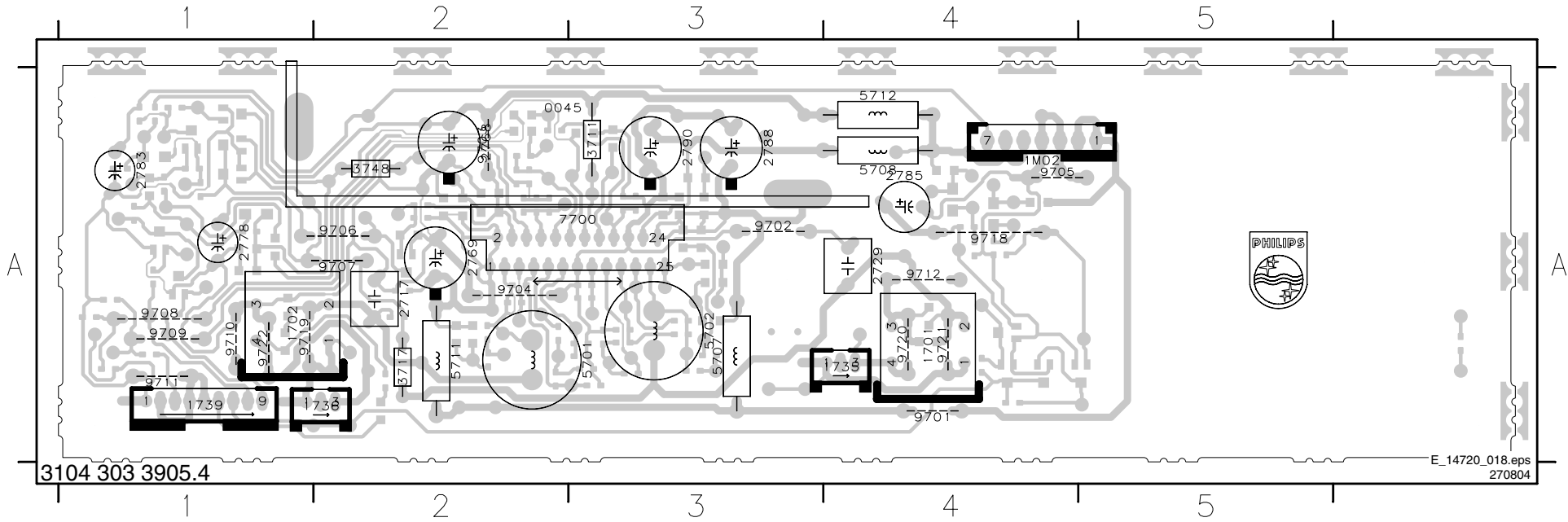
PDP Audio Panel



0045 E5	3761 B8	I717 A5
1701 F2	3762 D7	I718 B5
1702 F2	3763 C8	I719 E2
1735 F1	3764 C8	I720 D2
1736 F1	3765 D8	I721 B2
1739 E4	3766 D8	I722 B2
1M02 A8	3767 C9	I723 E2
2701 F3	3768 D9	I724 D2
2702 B3	3769 A2	I725 E1
2704 B2	3770 A1	I726 C2
2705 A6	3790 B3	I727 A5
2706 B3	3791 B2	I728 F3
2707 B3	3792 B2	I729 C4
2708 A2	3793 B3	I732 B5
2709 C5	3794 B4	I737 C6
2710 C4	3795 B4	I738 B5
2711 E1	3798 C5	I739 B6
2712 D4	3999 F8	I744 D5
2713 A6	5701 E3	I753 A2
2714 D3	5702 E2	I754 E2
2715 E3	5703 A4	I755 E3
2716 D3	5704 F4	I756 C1
2717 F3	5707 C1	I757 C2
2718 E2	5708 D1	I763 C6
2719 E4	5711 C4	I766 B8
2720 B2	5712 C4	I767 C8
2721 B1	6701 C6	I768 C8
2722 C1	6704 A6	I769 C9
2724 D1	6710 C8	I770 D8
2726 D2	6711 D8	I771 D8
2727 E2	7700 B2	I772 D9
2728 D2	7701 B6	I773 D8
2729 F2	7703 B6	I775 D4
2730 D4	7704 A5	I776 D3
2764 A2	7705 B6	I777 C2
2766 A3	7706 B6	I778 D2
2768 D4	7707 B5	I779 D2
2769 D4	7710 C8	I781 A2
2777 D1	7711 C9	I782 B2
2778 B5	7712 D8	I783 B3
2779 D2	7713 D9	I784 D8
2780 D4	7714 B4	I785 B8
2781 D4	9717 A5	I786 C9
2783 C7	9718 D8	I787 A3
2785 C8	9719 F2	I788 B6
2786 A3	9720 F2	I791 A3
2788 D1	9721 E2	I792 B2
2789 D1	9722 F2	I793 B2
2790 D1	F708 F2	I798 D4
2791 B4	F710 F2	I799 D3
2792 A1	F711 A1	
2793 A2	F712 A1	
3701 E5	F713 B2	
3702 A6	F714 B4	
3703 A6	F716 F7	
3704 A5	F717 F8	
3705 B2	F721 F2	
3706 D5	F722 F2	
3707 C5	F732 A9	
3708 D5	F733 A9	
3709 E4	F734 B9	
3710 D3	F735 B9	
3711 C4	F736 B9	
3712 E2	F737 F6	
3713 C6	F738 F2	
3714 B5	F739 F2	
3715 B5	F742 B8	
3716 B6	F743 D7	
3717 F3	F744 F5	
3718 F3	F745 F4	
3721 B1	I700 D5	
3722 C1	I701 D6	
3723 B1	I702 A6	
3724 E1	I703 A6	
3725 D2	I704 A6	
3726 E1	I705 C5	
3727 E4	I706 C4	
3743 E3	I707 C4	
3746 C5	I709 D3	
3747 C6	I710 E4	
3748 B5	I711 B3	
3750 F2	I713 D3	
3756 E3	I714 B4	
3757 F3	I715 C4	
3760 E3	I716 D2	

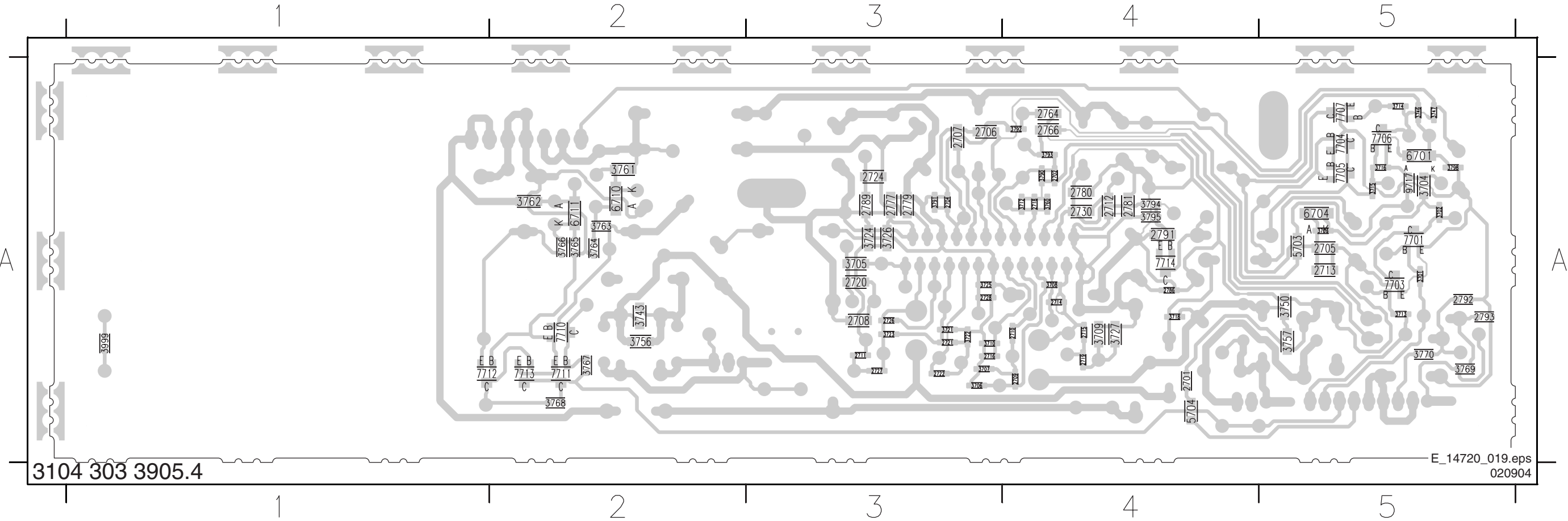
Layout PDP Audio Panel (Top Side)

0045 A1 1735 A4 1M02 A4 2768 A2 2783 A1 2790 A3 3748 A2 5707 A3 5712 A4 9702 A3 9705 A4 9708 A1 9711 A1 9719 A1 9722 A1  
1701 A4 1736 A2 2717 A2 2769 A2 2785 A4 5701 A2 5708 A4 7700 A3 9703 A2 9706 A2 9709 A1 9712 A4 9720 A4  
1702 A1 1739 A1 2729 A4 2778 A1 2788 A3 3717 A2 5702 A3 5711 A2 9701 A4 9704 A2 9707 A2 9710 A1 9718 A4 9721 A4

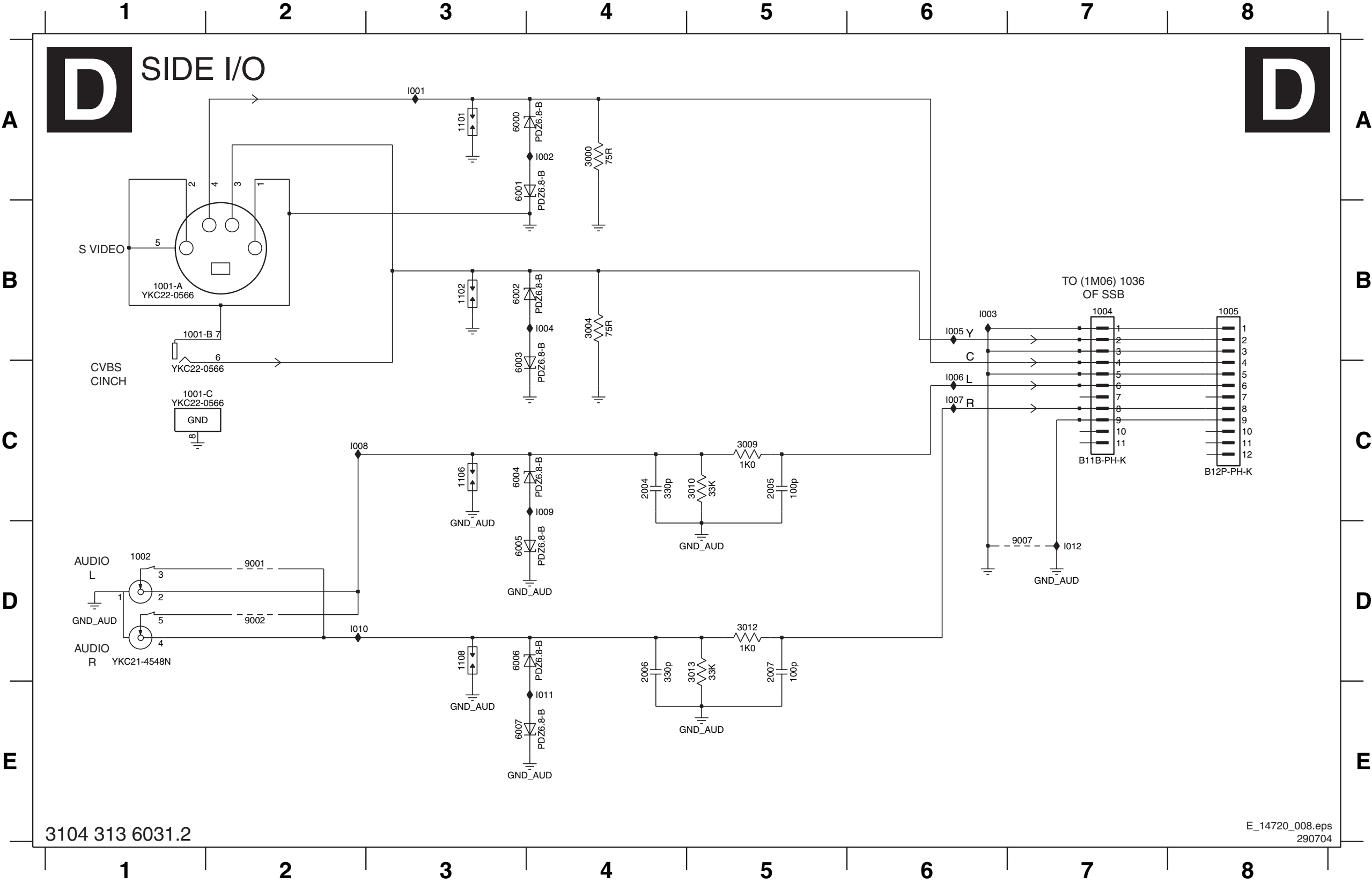


Layout PDP Audio Panel (Bottom Side)

0045 A4 2701 A4 2709 A4 2716 A3 2724 A3 2766 A4 2781 A4 2791 A4 3705 A3 3712 A4 3721 A3 3743 A2 3760 A4 3767 A2 3793 A4 5703 A5 6704 A5 7705 A5 7714 A4 9707 A4 9718 A2  
1701 A2 2702 A4 2710 A4 2717 A4 2726 A3 2768 A4 2783 A5 2792 A5 3706 A3 3713 A5 3722 A3 3746 A5 3761 A2 3768 A2 3794 A4 5704 A4 6710 A2 7706 A5 9701 A2 9708 A5 9719 A5  
1702 A5 2704 A3 2711 A3 2718 A4 2727 A3 2769 A4 2785 A2 2793 A5 3707 A3 3714 A5 3723 A3 3747 A5 3762 A2 3769 A5 3795 A4 5707 A3 6711 A2 7707 A5 9702 A3 9709 A5 9720 A2  
1735 A2 2705 A5 2712 A4 2719 A4 2728 A3 2777 A3 2786 A4 3701 A5 3708 A4 3715 A5 3724 A3 3748 A4 3763 A2 3770 A5 3798 A5 5708 A2 7700 A4 7710 A2 9703 A4 9710 A5 9721 A2  
1736 A4 2706 A3 2713 A5 2720 A3 2729 A2 2778 A5 2788 A3 3702 A5 3709 A4 3716 A5 3725 A3 3750 A5 3764 A2 3790 A4 3999 A1 5711 A4 7701 A5 7711 A2 9704 A4 9711 A5 9722 A5  
1739 A5 2707 A3 2714 A4 2721 A3 2730 A4 2779 A3 2789 A3 3703 A5 3710 A3 3717 A4 3726 A3 3756 A2 3765 A2 3791 A3 5701 A4 5712 A2 7703 A5 7712 A1 9705 A2 9712 A2  
1M02 A2 2708 A3 2715 A4 2722 A3 2764 A4 2780 A4 2790 A3 3704 A5 3711 A3 3718 A4 3727 A4 3757 A5 3766 A2 3792 A4 5702 A3 6701 A5 7704 A5 7713 A2 9706 A4 9717 A5

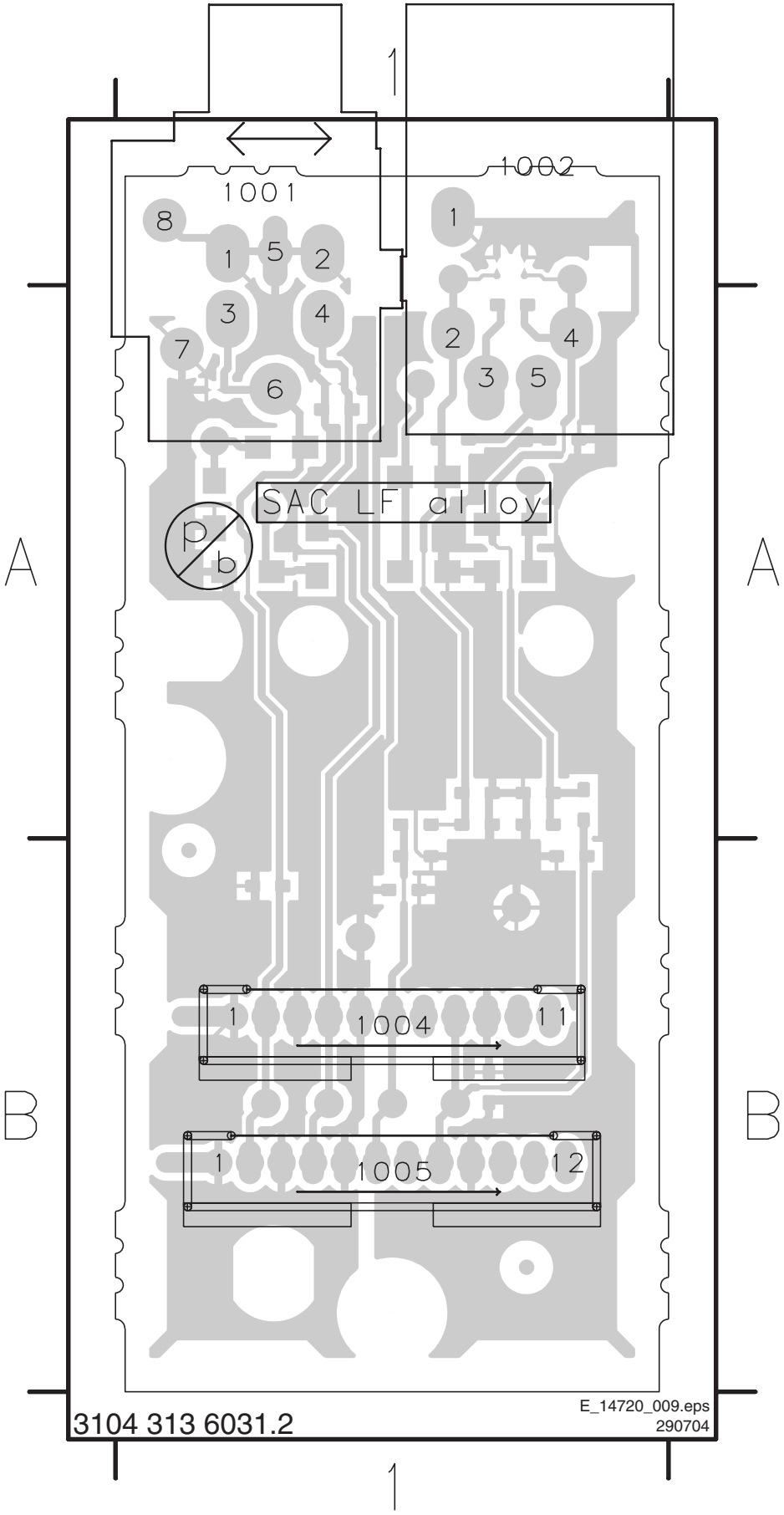


Side I/O Panel



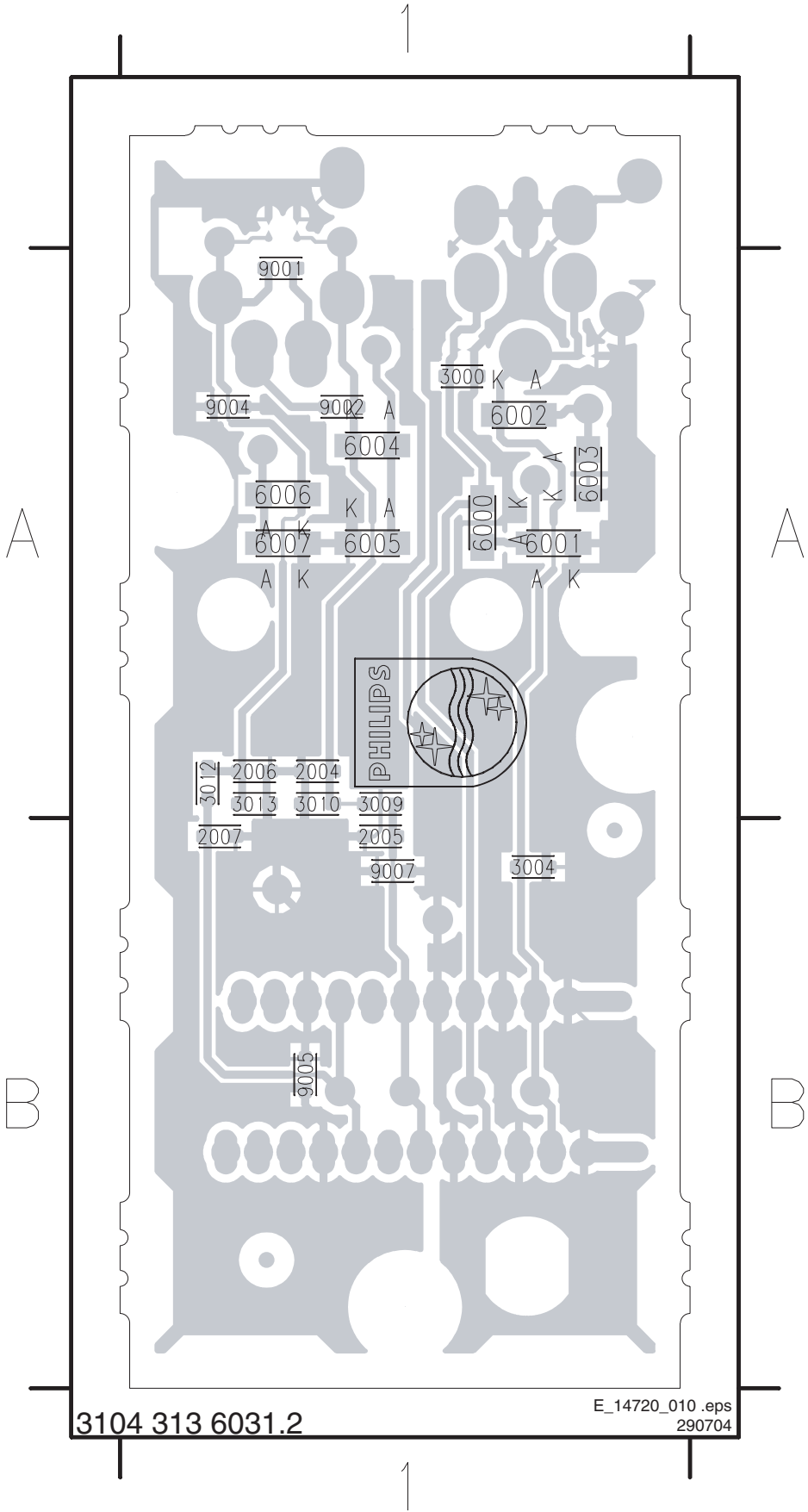
- 1001-A B1
- 1001-B B1
- 1001-C C1
- 1002 D1
- 1004 B7
- 1101 A3
- 1102 B3
- 1106 C3
- 1108 D3
- 2004 C4
- 2005 C5
- 2006 D4
- 2007 D5
- 3000 A4
- 3004 B4
- 3009 C5
- 3010 C5
- 3012 D5
- 3013 D5
- 6000 A3
- 6001 A3
- 6002 B3
- 6003 C3
- 6004 C3
- 6005 D3
- 6006 D3
- 6007 E3
- 9001 D2
- 9002 D2
- 9007 D7
- I001 A3
- I002 A4
- I003 B6
- I004 B4
- I005 B6
- I006 C6
- I007 C6
- I008 C2
- I009 C4
- I010 D2
- I011 E4
- I012 D7

Layout Side I/O Panel (Top Side)



- 1001 A1
- 1002 A1
- 1004 B1
- 1005 B1

Layout Side I/O Panel (Bottom Side)

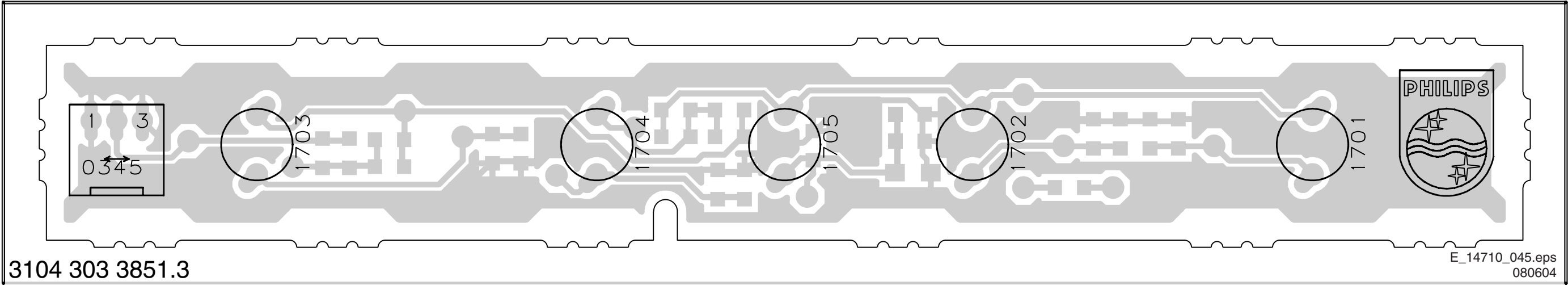


- 1001 A1
- 1002 A1
- 1004 B1
- 1005 B1
- 2004 A1
- 2005 B1
- 2006 A1
- 2007 B1
- 3000 A1
- 3004 B1
- 3009 A1
- 3010 A1
- 3012 A1
- 3013 A1
- 6000 A1
- 6001 A1
- 6002 A1
- 6003 A1
- 6004 A1
- 6005 A1
- 6006 A1
- 6007 A1
- 9001 A1
- 9002 A1
- 9004 A1
- 9005 B1
- 9007 B1



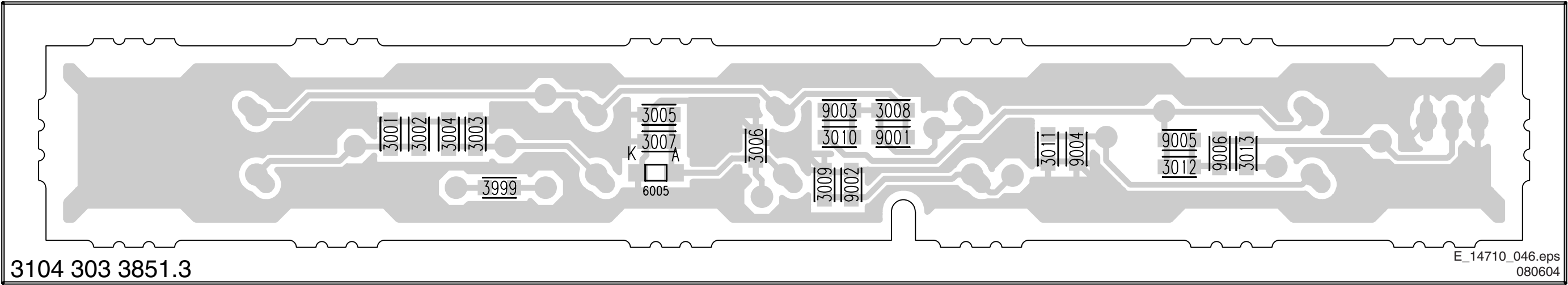
Layout Top Control Panel (Top Side)

0345    1701    1702    1703    1704    1705

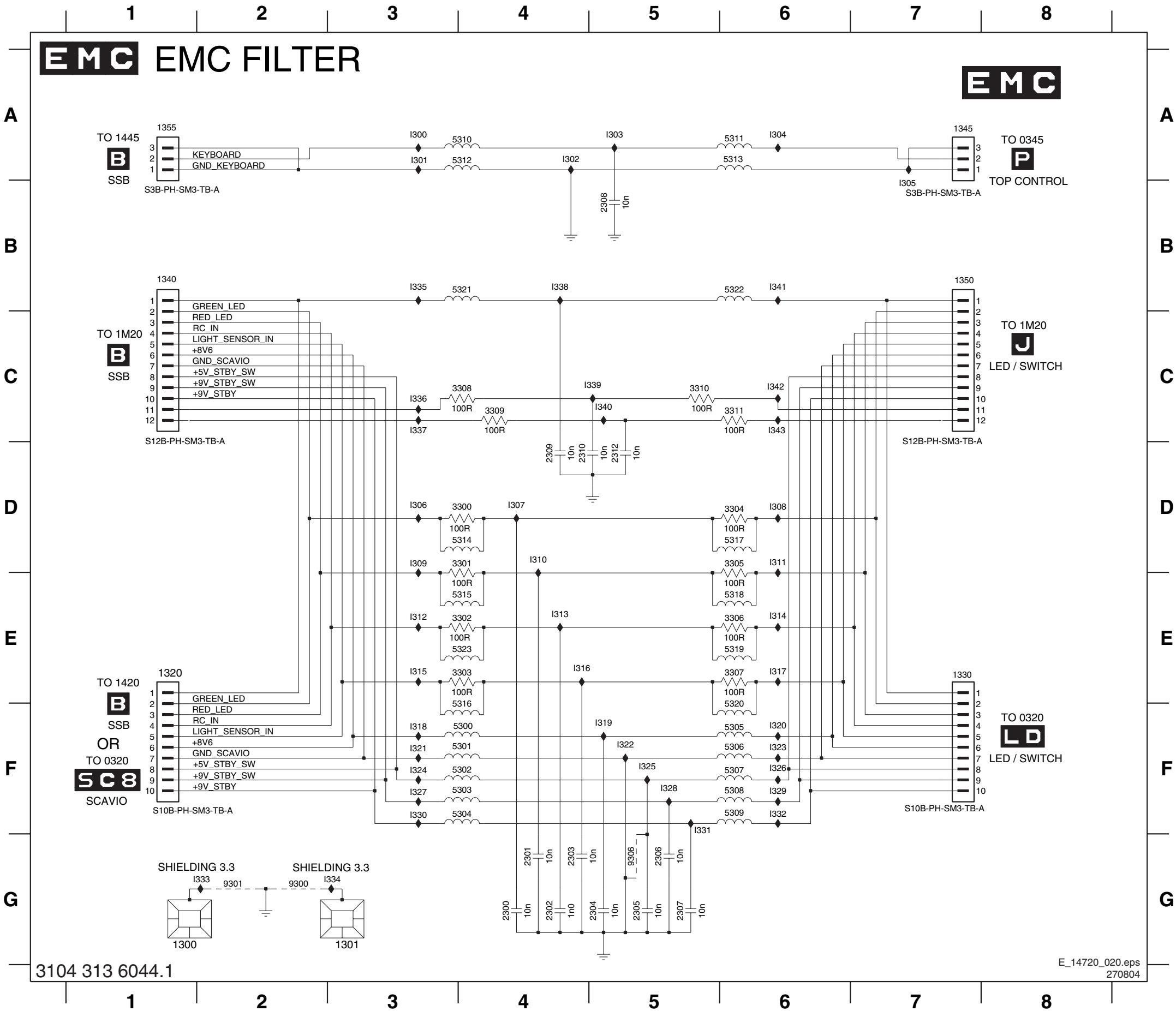


Layout Top Control Panel (Top Side)

3001    3003    3005    3007    3009    3011    3013    6005    9002    9004    9006  
3002    3004    3006    3008    3010    3012    3999    9001    9003    9005



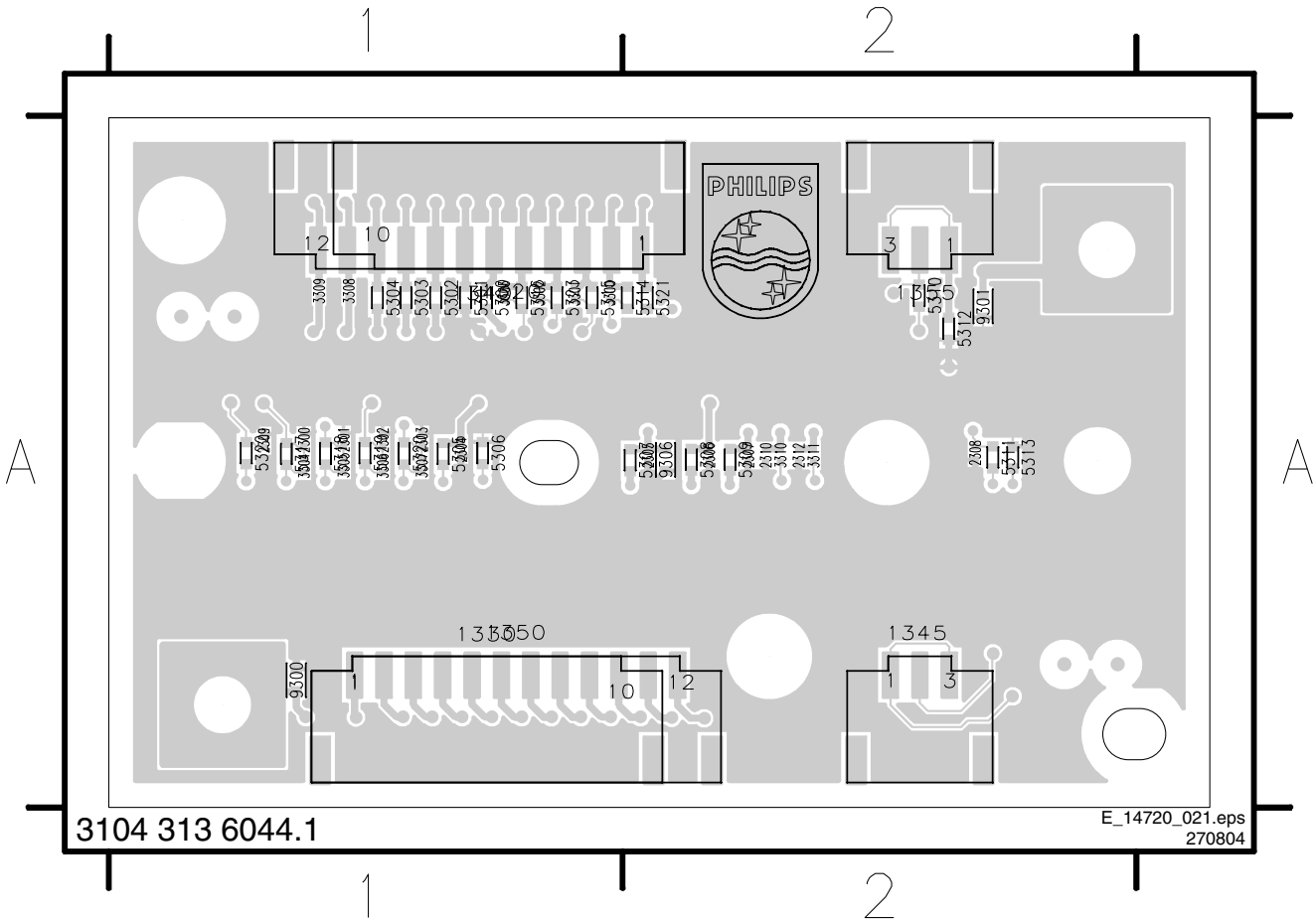
EMC Filter Panel



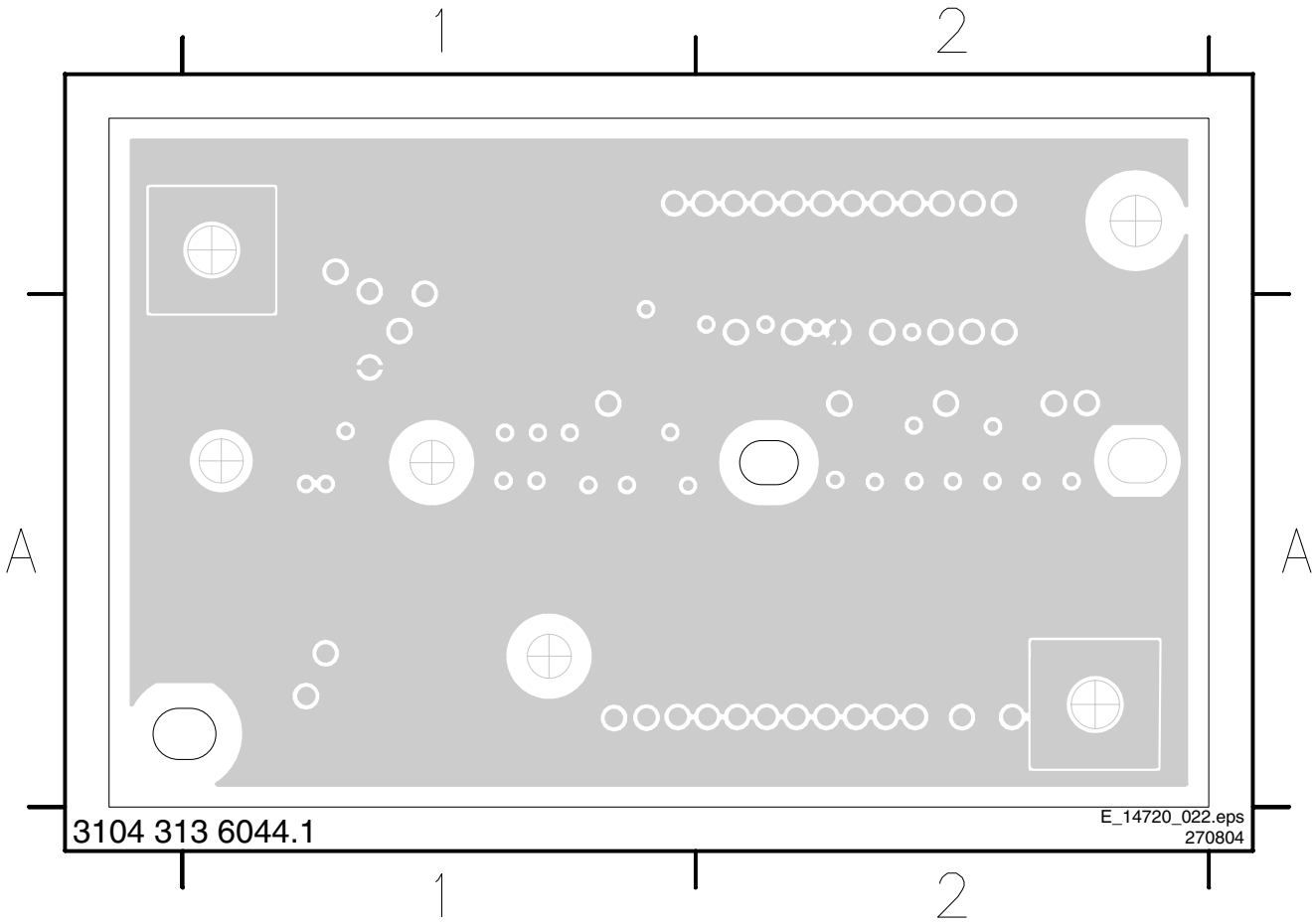
1300 G1	I315 E3
1301 G3	I316 E4
1320 E1	I317 E6
1330 E7	I318 F3
1340 B1	I319 F5
1345 A7	I320 F6
1350 B7	I321 F3
1355 A1	I322 F5
2300 G4	I323 F6
2301 G4	I324 F3
2302 G4	I325 F5
2303 G4	I326 F6
2304 G5	I327 F3
2305 G5	I328 F5
2306 G5	I329 F6
2307 G5	I330 F3
2308 B5	I331 F5
2309 D4	I332 F6
2310 D4	I333 G2
2312 D5	I334 G3
3300 D4	I335 B3
3301 D4	I336 C3
3302 E4	I337 C3
3303 E4	I338 B4
3304 D6	I339 C5
3305 D6	I340 C5
3306 E6	I341 B6
3307 E6	I342 C6
3308 C4	I343 C6
3309 C4	
3310 C5	
3311 C6	
5300 F4	
5301 F4	
5302 F4	
5303 F4	
5304 F4	
5305 F6	
5306 F6	
5307 F6	
5308 F6	
5309 F6	
5310 A4	
5311 A6	
5312 A4	
5313 A6	
5314 D4	
5315 E4	
5316 F4	
5317 D6	
5318 E6	
5319 E6	
5320 F6	
5321 B4	
5322 B6	
5323 E4	
9300 G2	
9301 G2	
9306 G5	
I300 A3	
I301 A3	
I302 A4	
I303 A5	
I304 A6	
I305 B7	
I306 D3	
I307 D4	
I308 D6	
I309 D3	
I310 D4	
I311 D6	
I312 E3	
I313 E4	
I314 E6	

Layout EMC Filter Panel (Top Side)

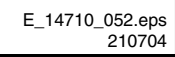
1320 A2	2301 A1	2308 A2	3303 A1	3310 A2	5305 A1	5312 A2	5319 A1	9306 A2
1330 A1	2302 A1	2309 A1	3304 A1	3311 A2	5306 A1	5313 A2	5320 A1	
1340 A1	2303 A1	2310 A2	3305 A1	5300 A1	5307 A2	5314 A2	5321 A2	
1345 A2	2304 A1	2312 A2	3306 A1	5301 A1	5308 A2	5315 A1	5322 A1	
1350 A1	2305 A2	3300 A1	3307 A1	5302 A1	5309 A2	5316 A1	5323 A1	
1355 A2	2306 A2	3301 A1	3308 A1	5303 A1	5310 A2	5317 A1	9300 A1	
2300 A1	2307 A2	3302 A1	3309 A1	5304 A1	5311 A2	5318 A1	9301 A2	



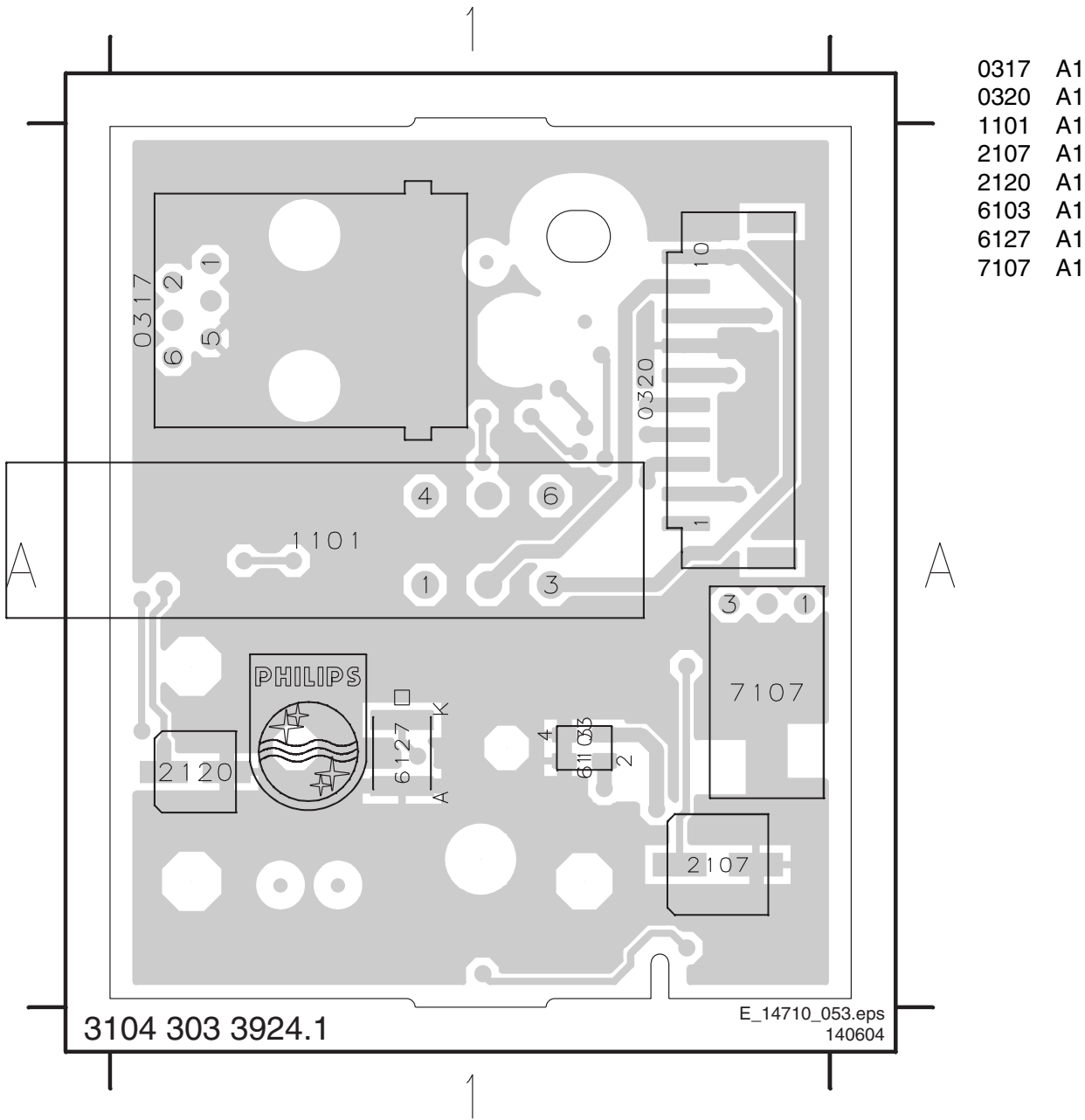
Layout EMC Filter Panel (Bottom Side)



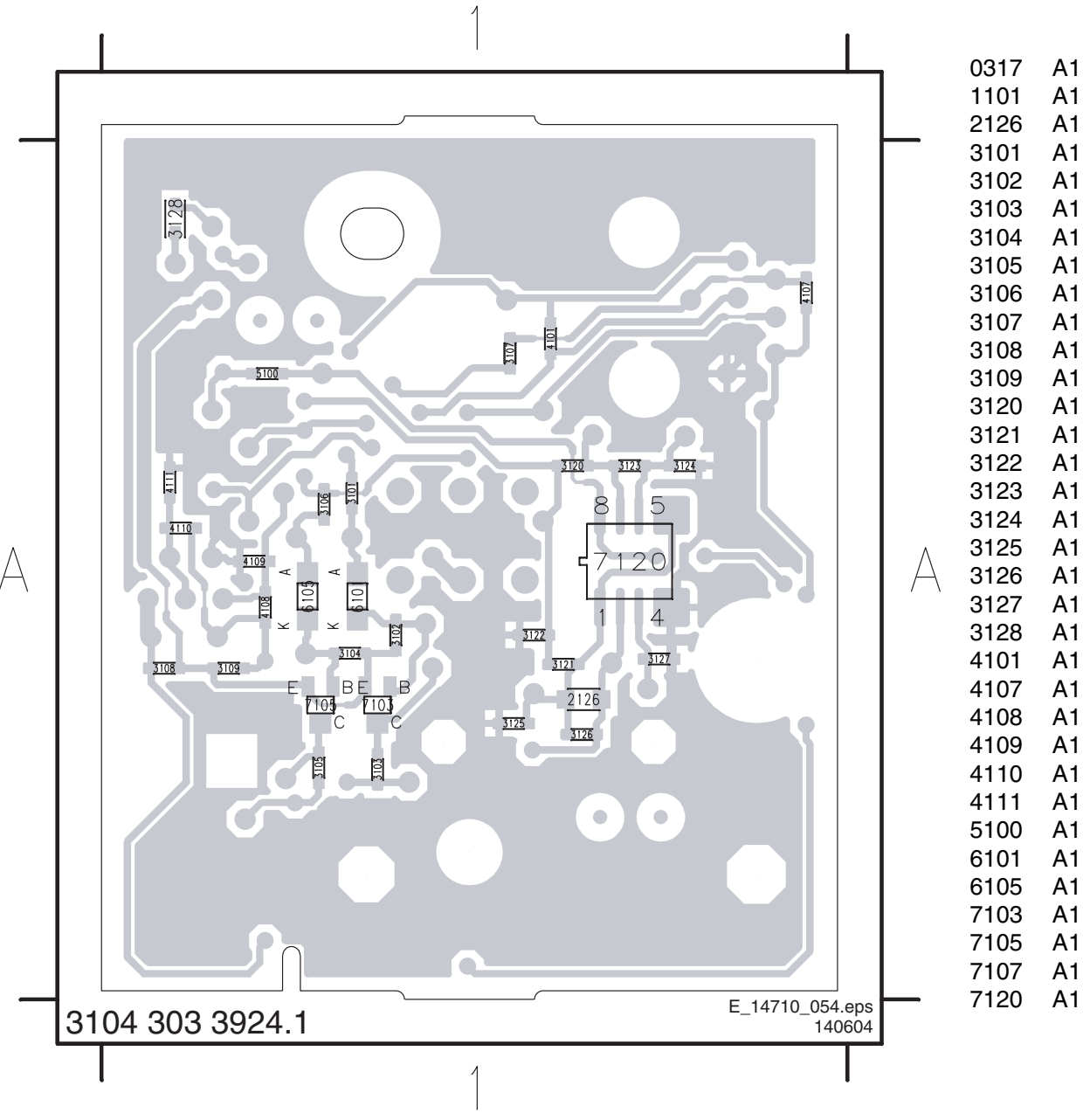
## J LED PANEL DISPLAY



Layout Led and Switch Panel (Top Side)



Layout Led and Switch Panel (Bottom Side)



## This image shows a full page of blank, lined paper. It features approximately 30 evenly spaced horizontal grey lines across the entire width of the page, typical of notebook or legal stationery. There are no margins, text, or other markings present.

## 8. Alignments

Index of this chapter:

1. General alignment conditions
2. Hardware alignments
3. Software alignments
4. Option settings

**Note:** The Service Default Mode (SDM) and Service Alignment Mode (SAM) are described in chapter 5. Menu navigation is done with the Cursor Up, Down, Left or Right keys of the remote control transmitter.

### 8.1 General Alignment Conditions

#### 8.1.1 Start Conditions

Perform all electrical adjustments under the following conditions:

- Power supply voltage (depends on region):
    - EU: 230 V<sub>AC</sub> / 50 Hz (± 10%).
    - US: 120 V<sub>AC</sub> / 60 Hz (± 10%).
    - AP: 120 V<sub>AC</sub> or 230 V<sub>AC</sub> / 50 Hz (± 10%).
  - Connect the set to the mains via an isolation transformer with low internal resistance.
  - Allow the set to warm up for approximately 15 minutes.
  - Measure voltages and waveforms in relation to chassis ground (with the exception of the voltages on the primary side of the power supply).
- Caution:** never use heatsinks as ground.
- Test probe: R<sub>i</sub> > 10 Mohm, C<sub>i</sub> < 20 pF.
  - Use an isolated trimmer/screwdriver to perform alignments.

#### 8.1.2 Initial Settings

Perform all electrical adjustments with the following initial settings:

1. To avoid the working of the lightsensor, set "Active Control" to "Off" (via the "Active Control" button on the RC).
2. Set "Smart Picture" to "Natural" or "Soft" (via the "Smart Picture" button on the RC).

#### 8.1.3 Alignment Sequence

- First, set the correct options:
  - In SAM, select OPTIONS,
  - Fill in the option settings according to the set sticker (see also paragraph "Option Settings"),
  - Store the OPTIONS by switching the set to STAND-BY.
- Warming up (>15 minutes).
- White-D alignment.

### 8.2 Hardware Alignments

No hardware alignments necessary.

### 8.3 Software Alignments

With the software alignments of the Service Alignment Mode (SAM), Options can be set and the WHITE TONE, TUNER (IF) and AUDIO settings can be aligned.

**To store the data:** Use the RC button MENU to switch to the main menu and then switch to STAND-BY mode.

#### 8.3.1 SAM Menu

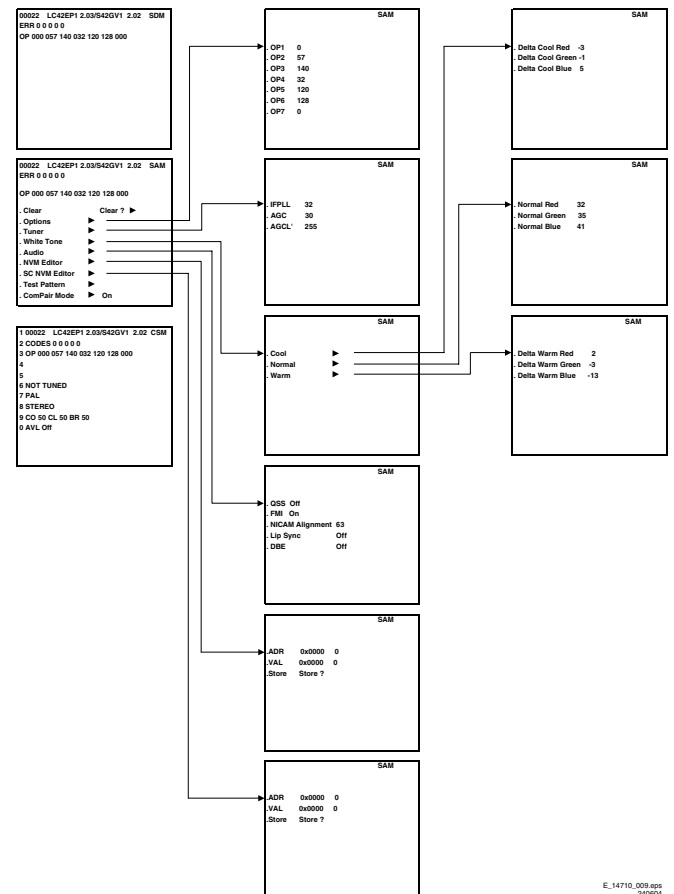


Figure 8-1 Overview SAM menu

#### 8.3.2 White Tone

##### Method 1 (with color analyser):

Supply a 100% white uniformity test signal to the tuner. Enter SAM menu. Color features are switched "off" automatically.

Do **NOT** change the SMART PICTURE, ACTIVE CONTROL and CONTRAST+ settings, to prevent activating of Green Enhancement, Blue Stretch, and Black Stretch. Offset values in NVM are used for HD-, HDMI- and VGA mode only the settings in TV mode need to be set. Make the following settings in the normal user menu, when television is in TV Mode:

Table 8-1 Picture settings for white tone alignment

	AUO	LPL	PDP
Contrast	99	99	99
Brightness	42	44	44
Color	50	50	50

Set the following settings in SAM:

WHITE TONE - NORMAL RED to: Initial value.  
 WHITE TONE - NORMAL GREEN to: Initial value.  
 WHITE TONE - NORMAL BLUE to: Initial value.

Initial value is: 200 for LCD sets (LPL and AUO) and 180 for PDP sets.

Measure the RGB values with a color analyzer.

Leave the value with the lowest output on the initial value.

Align the normal white points, by lowering the other 2 colors, to the right x-y coordinates (see table "White Tone alignment values").

**Note:** Only lower the colors to prevent clipping!

**Table 8-2 White Tone alignment values**

Color temp. (K)	Normal All regions (8700)
X	0.289
Y	0.299

**Note:** Measure with a calibrated (phosphor- independent) color analyser in the centre of the screen. Use a contact less analyser (e.g. Minolta CA-210) to align the LCD TV. The color analyser may not touch the screen surface. Also, the measurement needs to be done in a dark environment. The color analyser must be calibrated for the LCD or Plasma panel in question. See the manual of the color analyser for the procedure on how to perform this calibration. Only the values for Normal are aligned with X, Y values. The delta values for COLD and WARM are given below.

**Table 8-3 Fixed delta values**

Screen Type		RED	GREEN	BLUE
PDP	Delta Cool	-6	-10	+5
	Delta Warm	+4	-5	-19
LCD LPL	Delta Cool	-8	-12	+3
	Delta Warm	+2	-10	-21
LCD AUO	Delta Cool	-3	-12	+10
	Delta Warm	+5	-5	-20

After the alignment is finished, switch the set to STANDBY, in order to store the alignments. When disconnecting the power before doing this, the settings will not be stored.

#### **Method 2 (without color analyser):**

If you do not have a color analyser, you can use the default values. These values are based on the average values in production.

- Set the values for the NORMAL color temperature. Given in the table "Average statistical values for "NORMAL" from production.
- Set the delta values for the COOL and WARM mode. See table: "Fixed delta values."
- After the alignment is finished, switch the set to STANDBY, in order to store the alignments. When disconnecting the power before doing this, the settings will not be stored.

**Table 8-4 Average statistical values for "NORMAL" from production.**

Screen type		RED	GREEN	BLUE
PDP	Normal	???	???	???
LCD LPL	Normal	???	???	???
LCD AUO	Normal	???	???	???
Values are valid for all regions				
Recently a new and more accurate method to perform this alignment has been introduced. Therefore there are no statistical values available yet. When available they will be published in an update manual.				

### **8.3.3 Tuner Adjustment**

#### **AGC (RF AGC Take Over Point)**

Set pattern generator (e.g. PM5580) with colour bar pattern and connect to aerial input with RF signal amplitude - 10mV and set frequency for PAL/SECAM to 475.25 MHz. For France select the L'-signal.

- Activate the SAM-menu. Go to the sub-menu TUNER, select the sub-menu option AFC WINDOW and adjust the value to "100 kHz".
- Select the AGC sub-menu.
- Connect a DC multi-meter to test point F306 or pin1 of the tuner.
- Adjust the AGC until the voltage at pin 1 of the tuner is 3.3 V +0.5 / -1.0.
- The value can be increased or decreased by pressing the RIGHT/LEFT cursor button on the RC.
- Switch the set to STAND-BY to store the data.

### **8.3.4 Grey Scale Adjustment**

#### **SDTV Grey Scale Adjustment**

##### *Equipment and setting*

- E.g. Fluke 54200 or Philips PM5580.
- 100% "8-step grey scale" pattern.

##### *Alignment Method*

- Switch with the RC to TV mode,
- Press the MUTE button on RC,
- Set SMART PICTURE to SOFT mode,
- Activate the auto colour function by pressing key-sequence:  
"INFO - MUTE - MUTE - MUTE - INFO - MENU - INFO".

##### *Expected Results*

- Visual check if the 8 Grey levels are correct.

#### **Analog PC Grey Scale Adjustment**

##### *Equipment and setting*

- Quantum Data 802B.
- PC input signal, with 64 levels Grey scale pattern, 1024x768 @ 60Hz (Format= 81:DMT1060, Pattern= 123:Grey 64).
- PC input at D-sub VGA connector.

##### *Alignment Method*

- Switch with the RC to PC mode.
- Press the MUTE button on RC.
- Set BRIGHTNESS and CONTRAST to nominal "50".
- Activate the auto colour function by pressing key-sequence:  
"INFO - MUTE - MUTE - MUTE - INFO - MENU - INFO".

##### *Expected Results*

- Visual check if the 64 Grey levels are correct.

#### **HD Grey Scale Adjustment**

##### *Equipment and setting*

- Quantum Data 802B.
- HD input signal, Top half 100% colour bar and bottom half Grey scale pattern, 1920x1080i@60Hz YPbPr (Format= 1080i30, Pattern= HDBar100).
- HD input at D-sub VGA connector.

##### *Alignment Method*

- Switch with the RC to HD mode.
- Press the MUTE button on RC.

- Activate the auto colour function by pressing key-sequence:  
"INFO - MUTE - MUTE - MUTE - INFO - MENU - INFO".

*Expected Results*

- Visual check if Colour bar tint and Grey scale is correct.

**8.3.5 Sound**

No adjustments needed for sound.

**8.3.6 Options**

Options are used to control the presence/absence of certain features and hardware.

***How to change an Option Byte***

An Option Byte represents a number of different options. Changing these bytes directly makes it possible to set all options very fast. All options are controlled via seven option bytes. Select the option byte (OP1.. OP7) with the cursor UP/DOWN keys, and enter the new value.

Leaving the OPTION sub menu saves the changes in the Option Byte settings. Some changes will only take effect after the set has been switched "off" and "on" with the AC power switch (cold start).

Table 8-5 Option codes (general overview for all regions and displays)

Bit (DEC)	Option	Description	/61 (AP)	/69 (AP)	/93 (AP)	/00 (EU)	/37 (US)	Remarks
7 (128)	OP_PHILIPS_TUNER	Philips Tuner available	1	1	1	1	1	
6 (64)	OP_FM_RADIO	FM Radio available	0	0	0	0	0	
5 (32)	OP_LNA	Low Noise Amplifier available	0	0	0	0	0	
4 (16)	OP_ATS	Auto Tuning System	0	0	0	1	0	
3 (8)	OP_ACI	ACI	0	0	0	1	0	
2 (4)	OP_UK_PNP	After virgin = English + Great Britain	0	0	0	0	0	
1 (2)	OP_VIRGIN_MODE	Activate Plug & Play menu at start-up	0	0	0	0	0	
0 (1)	OP_CHINA	AP-PAL tuning algorithm for China	0	0	1	0	0	
OP1:			128	128	129	152	128	
7 (128)	OP_SMART_SOUND	Four smart sound settings	1	1	1	1	1	
6 (64)	OP_UI_GREEN	UI for Magnavox sets (NAFTA)	0	0	0	0	0	
5 (32)	OP_CHANNEL_NAMING	Naming of channel feature available	1	1	1	0	1	
4 (16)	OP_LTI	Histogr. algorithm available (TDA9178)	1	1	1	1	1	
3 (8)	OP_TILT	Picture Rotation available	0	0	0	0	0	
2 (4)	OP_FINE_TUNING	Fine Tuning algorithm available	1	1	1	1	1	
1 (2)	OP_PIP_PHILIPS_TUNER	PIP Philips tuner	0	0	0	0	0	
0 (1)	OP_HUE	Tint for NTSC transmission	1	0	0	0	1	
OP2:			181	180	180	148	181	
7 (128)	OP_EW_FUNCTION	Geometry adj. for Large screen sets	0	0	0	0	0	
6 (64)	OP_2TUNER_PIP	Double Tuner for PIP available	0	0	0	0	0	
5 (32)	OP_PIP_SPLITTER	Not used	0	0	0	0	0	
4 (16)	OP_SPLITTER	Not used	0	0	0	0	0	
3 (8)	OP_VIRTUAL_DOLBY	Virtual Dolby Effect	1	1	1	1	1	
2 (4)	OP_WIDE_SCREEN	16:9 sets	1	1	1	1	1	
1 (2)	OP_WSSB	Wide Screen Signalling Bit detection	0	1	0	1	0	
0 (1)	OP_ECO_SUBWOOFER	Sub woofer available	0	0	0	0	0	
OP3:			12	14	12	14	12	
7 (128)	OP_LIP_SYNC	Lip Synchronisation Circuit available	0	0	0	0	0	Not for LCD
6 (64)	OP_NOTUSED2	Not used	0	0	0	0	0	
5 (32)	OP_ULTRA_BASS	Ultra Bass Boost available	0	0	0	0	0	
4 (16)	OP_DELTA_VOLUME	Delta Volume feature available	0	0	0	1	0	EU only
3 (8)	OP_NOTUSED3	Not used	0	0	0	0	0	
2 (4)	OP_NOTUSED4	Not used	0	0	0	0	0	
1 (2)	OP_STEREO_DBX	Stereo DBX for NTSC available	0	0	0	0	1	NTSC only
0 (1)	OP_STEREO_NICAM_2CS	Stereo NICAM 2CS available	0	1	0	1	0	
OP4:			0	1	0	17	2	
7 (128)	OP_AV1	External Source 1 available	1	1	1	1	1	
6 (64)	OP_AV2	External Source 2 available	1	1	1	1	1	
5 (32)	OP_AV3	External Source 3 (Side AV) available	1	1	1	1	1	
4 (16)	OP_CVI	Component Video In available	1	1	1	0	1	Not for EU
3 (8)	OP_SVHS2	Super Video Home System 2 available	0	0	0	0	0	
2 (4)	OP_SVHS3	Super Video Home System 3 available	0	0	0	0	0	
1 (2)	OP_HOTEL_MODE	LATAM specific simplified Hotel Mode	0	0	0	0	0	
0 (1)	OP_NOTUSED	Not used	0	0	0	0	0	
OP5:			240	240	240	224	240	
7 (128)	OP_PERSONAL_ZAPPING	Zapping of channels feature available	0	0	0	0	0	
6 (64)	OP_SMART_SURF	Surf List available	0	0	0	0	0	
5 (32)	OP_FMTRAP	FM trap available	0	0	0	0	0	
4 (16)	OP_COMBFILTER	comb filter available	1	1	1	1	1	Internal Hercules
3 (8)	OP_ACTIVE_CONTROL	Auto Picture Impr. feature available	1	1	1	1	1	
2 (4)	OP_SMART_LOCK	Toggle Child Lock & Lock Chan. enabled	1	1	1	1	1	
1 (2)	OP_LIGHT_SENSOR	Light Sensor enabled	1	1	1	1	1	
0 (1)	OP_TWIN_TEXT	2 txt pages on screen available	0	1	1	1	0	
OP6:			30	31	31	31	30	
7 (128)	OP_TIME_WIN1	1= 5 s, 0= 2 s (Europe fixed 1.2 s)	1	0	1	0	1	
4 (16)	OP_3DCOMB	3D comb filter available	1	0	0	0	1	NTSC only
AP-PAL								
3 (8)	OP_COLOR_SYSTEM_AP	1: Auto, PAL 4.43, NTSC 4.43, NTSC 3.58, SECAM 0: OFF- Auto, PAL 4.43, NTSC 4.43, NTSC 3.58	0	1	0	0	0	
2 (4)	OP_SOUND_SYSTEM_AP_1	000: BG 001: BG / DK 010: I / DK 011: BG / I / DK 100: BG / I / DK / M	1	1	1	0	0	
1 (2)	OP_SOUND_SYSTEM_AP_2		0	0	0	0	0	
0 (1)	OP_SOUND_SYSTEM_AP_3		0	0	0	0	0	
EUROPE								
3 (8)	OP_DUMMY6	Not used	0	0	0	0	0	
2 (4)	OP_DUMMY7	Not used	0	0	0	0	0	
1 (2)	OP_WEST_EU	West Europe Set (0 - East Europe Set) by default "on"	0	0	0	1	0	
0 (1)	OP_MULTI_STANDARD_EUR	For Europe multi standard set	0	0	0	1	0	
LATAM								
3 (8)	OP_DUMMY6	Not used	0	0	0	0	0	
2 (4)	OP_DUMMY7	Not used	0	0	0	0	0	
1 (2)	OP_SYSTEM_LT_1	00: NTSC-M, 01: NTSC-M, PAL-M, 10: NTSC-M, PAL-M, PAL-N,	0	0	0	0	0	
0 (1)	OP_SYSTEM_LT_2	11: NTSC-M, PAL-M, PAL-N, PAL-BG	0	0	0	0	0	
NAFTA & AP-NTSC								
3 (8)	OP_DUMMY6	Not used	0	0	0	0	0	
2 (4)	OP_DUMMY7	Not used	0	0	0	0	0	
1 (2)	OP_DUMMY8	Not used	0	0	0	0	0	
0 (1)	OP_DUMMY9	Not used	0	0	0	0	0	
OP7:			148	12	132	3	144	

## 9. Circuit Descriptions, Abbreviation List, and IC Data Sheets

Index of this chapter

1. Introduction
2. Block Diagram
3. Power Supply
4. Input/Output
5. Tuner and IF
6. Video: TV Part
7. Video: Scaler Part
8. Audio Processing
9. Control
10. Display
11. Abbreviation List
12. IC Data Sheets

### Note:

- Only **new** (not recently published) circuits are described here. For the other circuit descriptions, see a.o. the A02, FTL13, and FTL2.1 Service Manuals.
- Figures can deviate slightly from the actual situation, due to different set executions.
- For a good understanding of the following circuit descriptions, please use the wiring, block and circuit diagrams. Where necessary, you will find a separate drawing for clarification.

### 9.1 Introduction

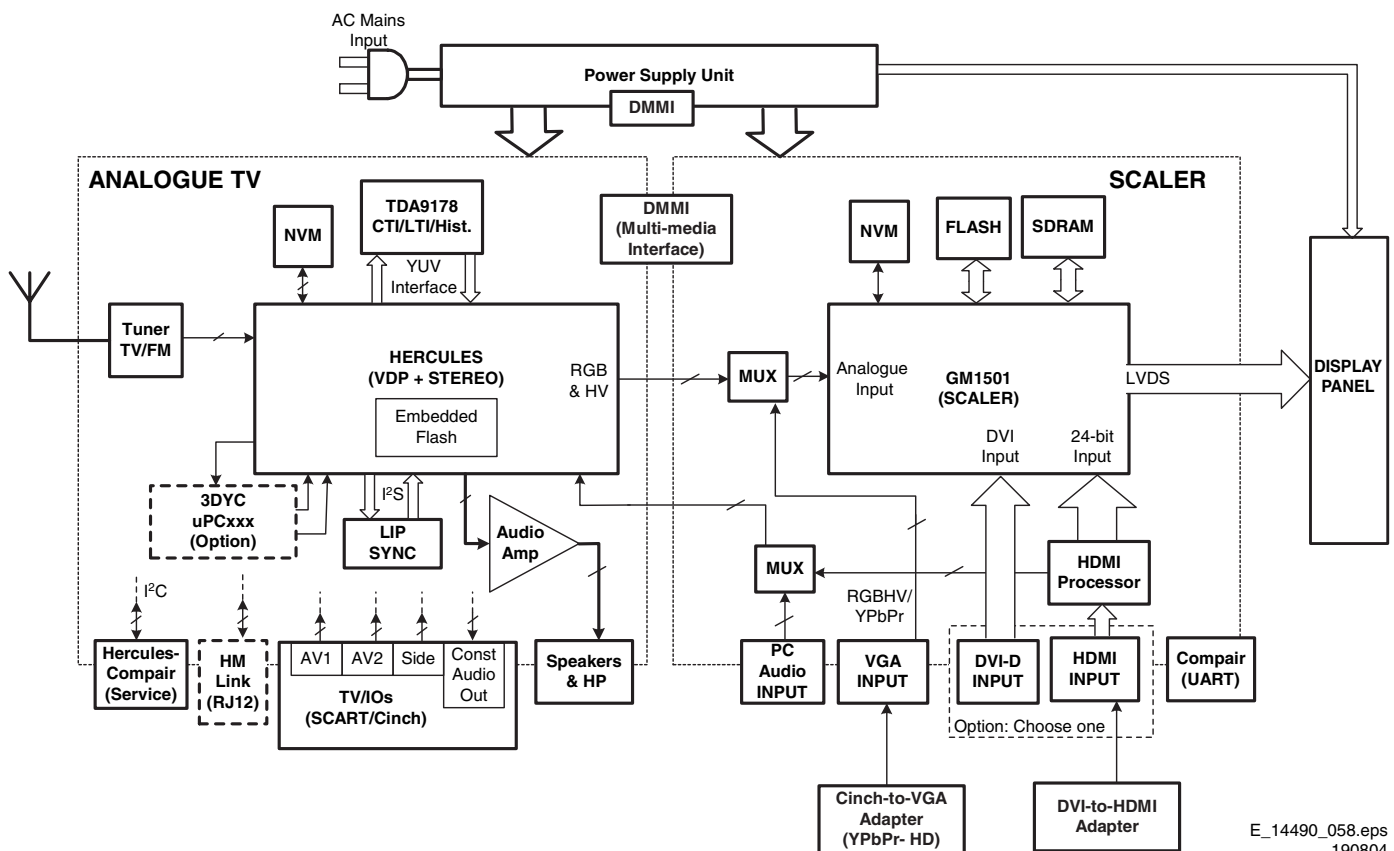
The LC4.x is a global chassis for the year 2004. Its architecture is based upon the LC03 chassis (LC4.6 is LCD, LC4.7 is PDP). This chassis has the following (new) features:

- **Audio:** The sound processor is part of the UOC processor (called "Hercules").
- **Video:** Enhanced video features, video drivers, Active Control and multiple PIP.

The functions for video/audio processing, microprocessor (uP), and CC/Teletext (TXT) decoder are all combined in one IC (TDA120xx, item 7011), the so-called third generation Ultimate One Chip (UOC-III) or "Hercules". This chip has the following features:

- Control, small signal, mono/stereo, and extensive Audio/Video switching in one IC.
- Upgrade with digital sound & video processing.
- Alignment free IF.
- FM sound, no traps/bandpass filters.
- Full multi-standard color decoder.
- One Xtal reference for all functions (microprocessor, RCP, TXT/CC, RDS, color decoder, and stereo sound processor).

### 9.2 Block Diagram



E\_14490\_058.eps  
190804

Figure 9-1 Block Diagram

The PLL tuner delivers the IF-signal, via audio & video SAW-filters, to the Video Signal Processor with FLASH embedded TEXT/Control/Graphics m-Controller (TCG m-Controller) and US Closed Caption decoder. TDA120x1 (item 7011, also called Hercules). This IC has the following functions:

- Analogue Video Processing.
- Sound Demodulation.
- Audio Interfaces and switching.
- Volume and tone control for loudspeakers.
- Reflection and delay for loudspeaker channels.
- Micro Controller.
- Data Capture.
- Display.

The Hercules has one input for the internal CVBS signal and a video switch with 3 external CVBS inputs and a CVBS output. All CVBS inputs can be used as Y-input for Y/C signals. However, only 2 Y/C sources can be selected because the circuit has 2 chroma inputs. It is possible to add an additional CVBS(Y)/C input (CVBS/YX and CX) when the YUV interface and the RGB/YPRPB input are not needed. The I/O is divided over two parts: Rear I/O and Side I/O. The rear has two SCART inputs and a PC (VGA) input. The side has a CVBS and Y/C (SVHS) input. The video part delivers the RGB signals to the Scaler IC.

The Genesis GM1501 Malibu Scaler IC can receive different video input signals: SDTV (from Hercules) or PC (VGA) (from external computer).

After the video processing, the digital data is send via a Low Voltage Differential Signalling bus to the display panel. LVDS is used to improve data speed and to reduce EMI significantly.

There are two I<sup>2</sup>C lines and two interrupt and communication lines (TV\_IRQ and TV\_SC\_COM) for the Scaler control. The Scaler communicates with the Hercules as a slave device. To avoid buffer overflow at the Scaler side, the TV\_SC\_COM line provides the necessary hardware flow control. To allow bi-directional communication, the Scaler can initiate a service interrupt-request to the Hercules via the TV\_IRQ line.

The Hercules, and EEPROM are supplied with 3.3 V, which is also present during STANDBY.

The EEPROMs, or NVMs (Non Volatile Memory) are used to store the settings.

The sound part is built up around the Hercules. The Source Selection, Decoding and Processing are all done by the Hercules.

Power supply input are several DC voltages coming from a supply panel.

## 9.3 Power Supply (SDI plasma panel)

See the FTP1.1 manual for a more detailed description.

### 9.3.1 Start-up sequence

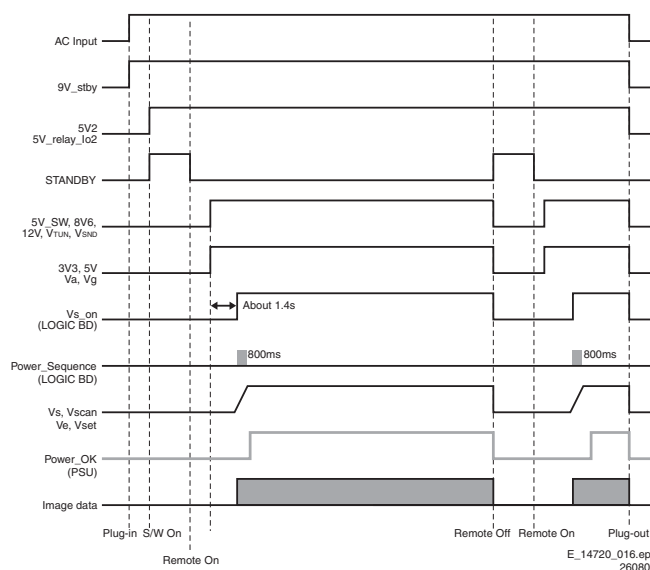


Figure 9-2 Start-up sequence SDI plasma panel

## 9.4 Input/Output

The I/O is divided over two parts: Rear I/O and Side I/O. The rear has two SCART inputs, a PC (VGA) input, and an Audio input. The side has a CVBS and Y/C (SVHS) input.

**EXT1:** The input of SCART1 is CVBS + RGB + L/R and the output is the video (+ sound) signal from the tuner (SC1\_CVBS\_RF\_OUT).

**EXT2:** The input of SCART2 is Y/C + CVBS + L/R. The output signal is CVBS\_SC2\_MON\_OUT (+ sound). SCART2 is meant for VCR and has therefore some additional signals in relation to EXT1 but no RGB: it has the possibility for Y/C\_in: Y\_in on pin 20 and Chroma\_in on pin 15. The selection of the external I/O's is controlled by the Hercules.

**PC (VGA) in:** This input is directly going to the Scaler IC. See paragraph "Video: Scaler Part".

## 9.5 Tuner and IF

A Philips UV13xx Tuner is used in the TV board. The SIF signals are decoded by the Hercules. Tuning is done via I<sup>2</sup>C.

### 9.5.1 Video IF amplifier

The IF-filter is integrated in a SAW (Surface Acoustic Wave) filter. One for filtering IF-video (1328) and one for IF-audio (1330). The type of these filters is depending of the standard(s) that has to be received.

The output of the tuner is controlled via an IF-amplifier with AGC-control. This is a voltage feedback from pin 31 of the Hercules to pin 1 of the tuner. The AGC-detector operates on top sync and top white level. AGC take-over point is adjusted via the service alignment mode "Tuner" - "AGC". If there is too much noise in the picture, then it could be that the AGC setting is wrong. The AGC-setting could also be mis-aligned if the picture deforms with perfect signal; the IF-amplifier amplifies too much.

## 9.6 Video: TV Part (diagrams A1, A2, and A3)

The video processing is completely handled by the Hercules

- IF demodulator.
- Chrominance decoder
- Sync separator.
- Horizontal & vertical drive.
- RGB processing.
- CVBS and SVHS source select.

It has also build in features like:

- CTI.
- Black stretch.
- Blue stretch.
- White stretch.
- Slow start up.
- Dynamic skin tone correction etc.

Further, it also incorporates sound IF traps and filters, and requires only one crystal for all systems.

### 9.6.1 Histogram (YUV picture improvement) IC

The demodulated video-signal can be checked on pins 74, 75, and 76 of IC7011 and is fed to pins 70, 71, and 72. In this path, the Histogram IC TDA9171 is inserted.

This TDA9178 can control various picture improvements:

- Histogram processing.
- Colour transient improvement.
- Luminance transient improvement.
- Black and white stretch.
- Skin tone correction.
- Green enhancement.
- Blue stretch.
- Smart peaking.
- Video dependent coring.
- Colour dependent stretching.

Since the TDA9171 is connected to the Hercules, picture improvement works only for signals that are routed through the Hercules and not for signals directly connected to the Scaler.

## 9.7 Video: Scaler Part (diagram A7 and A13)

The Genesis GM1501 Scaler is a dual channel graphics and video processing IC for flat monitors and televisions incorporating Picture in Picture, up to SXGA output resolutions. The Scaler controls the display processing in a FTV, e.g. like the deflection circuit in a CRT-based TV. It controls all the view modes (e.g. like "zooming" and "shifting"). Features like PC (VGA) or HD inputs, are also handled by this part.

### 9.7.1 Features

The Scaler provides several key IC functions:

- Scaling.
- Auto-configuration/ Auto-Detection.
- Various Input Ports:
  - Analog RGB.
  - Video Graphics.
- Integrated LVDS Transmitter.
- On-chip Micro-controller

### 9.7.2 Inputs

#### Analog RGB

The RGB input is fed to pins B2, C2 and D2. This input consists of either the Hercules RGB output or the RGB/YpbPr input of the VGA connector. The Scaler can switch between the two signals via the PC\_HD\_SEL signal and selection IC SM5301.

#### PC (VGA) input

The VGA input is processed by the VGA block of the Scaler. The Scaler supports pixel frequencies up to 165MHz. YpbPr format is also supported via the VGA interface and covers resolutions of 480p/560p/720p/1080i.

### 9.7.3 Output

The Display Output Port provides data and control signals that permit the Scaler to connect to a variety of display devices using a TTL or LVDS interface. The output interface is configurable for single or dual wide TTL/LVDS in 18, 24 or 30-bit RGB pixels format. All display data and timing signals are synchronous with the DCLK output clock. The integrated LVDS transmitter is programmable to allow the data and control signals to be mapped into any sequence depending on the specified receiver format.

## 9.8 Audio Processing

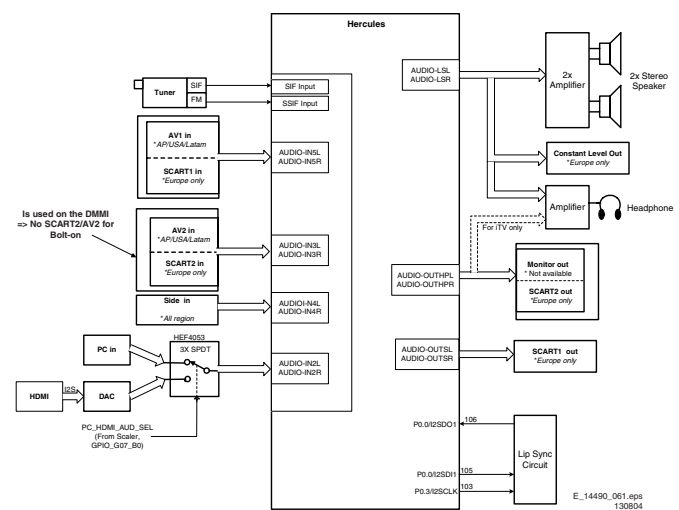


Figure 9-3 Block diagram audio processing

The audio decoding is done entirely via the Hercules. The IF output from the Tuner is fed directly to either the Video-IF or the Sound-IF input depending on the type of concept chosen. There are mainly two types of decoder in the Hercules, an analogue decoder that decodes only Mono, regardless of any standards, and a digital decoder (or DEMDEC) that can decode both Mono and Stereo, again regardless of any standards.

In this chassis, the analogue decoder is used in two cases:

- It is used for AM Sound demodulation in the Europe SECAM LL' transmission.
- It is used for all FM demodulation in AV-Stereo sets.

### 9.8.1 Diversity

The diversity for the Audio decoding can be broken up into two main concepts:

- The Quasi Split Sound concept used in Europe and some AP sets.
- The Inter Carrier concept, used in NAFTA and LATAM.

The UOC-III family makes no difference anymore between QSS- and Intercarrier IF, nearly all types are software-switchable between the two SAW-filter constructions.

Simple data settings are required for the set to determine whether it is using the Inter Carrier or the QSS concept. These settings are done via the "QSS" and "FMI" bit found in SAM mode. Due to the diversity involved, the data for the 2 bits are being placed in the NVM location and it is required to write once during startup.

On top of that, it can be further broken down into various systems depending on the region. The systems or region chosen, will in turn affect the type of sound standard that is/are allowed to be decoded.

- For Europe, the standard consists of BG/DK/I/LL' for a Multi-System set. There are also versions for Eastern Europe and Western Europe and the standard for decoding will be BG/DK and I/DK respectively.
- For NAFTA and LATAM, there is only one transmission standard, which is the M standard. The diversity then will be based on whether it has a dBx noise reduction or a Non-dBx (no dBx noise reduction).
- For AP, the standard consists of BG/DK/I/M for a Multi-System set. The diversity here will depend on the region. AP China can have a Multi-System and I/DK version. For India, it might only be BG standard.

### 9.8.2 Functionality

The features available in the Hercules are as follows:

- Treble and Bass Control.
- Surround Sound Effect that includes:
  - Incredible Stereo.
  - Incredible Mono.
  - 3D Sound (not for AV Stereo).
  - TruSurround (not for AV Stereo).
  - Virtual Dolby Surround, VDS422 (not for AV Stereo).
  - Virtual Dolby Surround, VDS423 (not for AV Stereo).
  - Dolby Pro-Logic (not for AV Stereo).
- Bass Feature that includes:
  - Dynamic Ultra-Bass.
  - Dynamic Bass Enhancement.
  - BBE (not for AV Stereo).
- Auto-Volume Leveler.
- 5 Band Equalizer.
- Loudness Control.

All the features stated are available for the Full Stereo versions and limited features for the AV Stereo

### 9.8.3 Audio Amplifier Panel (diagram SA3)

#### Introduction

This panel contains the audio filters and amplifiers necessary for driving the speakers.

The audio inputs come from the SSB (via connector 1739). The PSU delivers the positive and negative supply voltage of 16 VDC.

After being filtered and amplified, the signals go to the speaker section, where the full range speakers are driven (load impedance is 8 ohm).

#### Amplifier

The amplifier is an integrated class-D amplifier (TDA7490). It combines a good performance with a high efficiency, resulting in a big reduction in heat generation.

#### Principle

Audio-power-amplifier systems have traditionally used linear amplifiers, which are well known for being inefficient. In fact, a linear Class AB amplifier is designed to act as a variable resistor network between the power supply and the load. The transistors operate in their linear region, and the voltage that is dropped across the transistors (in their role as variable resistors) is lost as heat, particularly in the output transistors. Class D amplifiers were developed as a way to increase the efficiency of audio-power-amplifier systems.

The Class D amplifier works by varying the duty cycle of a Pulse Width Modulated (PWM) signal.

By comparing the input voltage to a triangle wave, the amplifier increases duty cycle to increase output voltage, and decreases duty cycle to decrease output voltage.

The output transistors of a Class D amplifier switch from 'full off' to 'full on' (saturated) and then back again, spending very little

time in the linear region in between. Therefore, very little power is lost to heat. If the transistors have a low 'on' resistance (RDS(ON)), little voltage is dropped across them, further reducing losses.

A Low Pass Filter at the output passes only the average of the output wave, which is an amplified version of the input signal. In order to keep the distortion low, negative feedback is applied (via R3723/3708).

The advantage of Class D is increased efficiency (= less heat dissipation). Class D amplifiers can drive the same output power as a Class AB amplifier using less supply current. The disadvantage is the large output filter that drives up cost and size. The main reason for this filter is that the switching waveform results in maximum current flow. This causes more loss in the load, which causes lower efficiency. An LC filter with a cut-off frequency less than the Class D switching frequency, allows the switching current to flow through the filter instead of the load. The filter is less lossy than the speaker, which causes less power dissipated at high output power and increases efficiency in most cases.

#### Mute

A mute switch (item 7701) is provided at pin 6. This switch is controlled by the SOUND\_ENABLE line from the Hercules (mute during operation).

#### Protections

Because of the symmetrical supply, a DC-blocking capacitor, between the amplifier and the speaker, is not necessary. However, it is still necessary to protect the speaker for DC voltages. Therefore, the following protections are therefore implemented:

- Via R3765 and R3767, each stabilised supply voltage line is checked on deviations.
- Via R3718 and 3717, each amplifier output is checked for DC-voltage.

## 9.9 Control

### 9.9.1 Hercules

The System Board has two main micro-controllers on board. These are:

- On-chip x86 micro-controller (OCM) from Genesis LCD TV/Monitor Controller.
- On-chip 80C51 micro-controller from Philips Semiconductors UOCIII (Hercules) series.

Each micro-controller has its own I2C bus which hosts its own internal devices.

The Hercules is integrated with the Video and Audio Processor. For dynamic data storage, such as SMART PICTURE and SMART SOUND settings, an external NVM IC is being used. Another feature includes an optional Teletext/Closed Caption decoder with the possibility of different page storage depending on the Hercules type number.

The Micro Controller ranges in ROM from 128 kB with no TXT-decoder to 128 kB with a 10 page Teletext or with Closed Caption.

### 9.9.2 Block Diagram

The block diagram of the Micro Controller application is shown below.

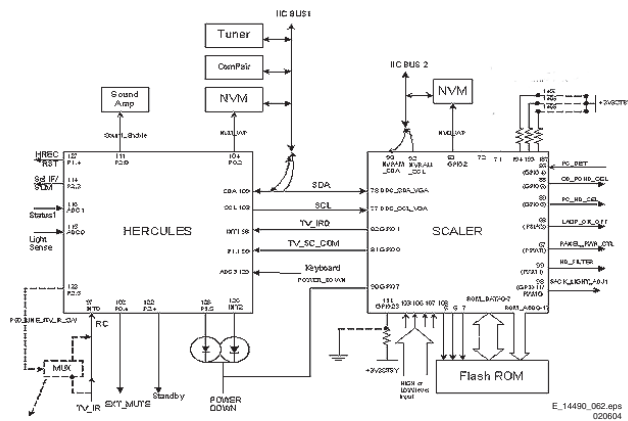


Figure 9-4 Micro Controller block diagram

### 9.9.3 Basic Specification

The Micro Controller operates at the following supply voltages:

- +3.3 V<sub>DC</sub> at pins 4, 88, 94, and 109.
- +1.8 V<sub>DC</sub> at pins 93, 96, and 117.
- I<sup>2</sup>C pull up supply: +3.3 V<sub>DC</sub>.

### 9.9.4 Pin Configuration and Functionality

The ports of the Micro Controller can be configured as follows:

- A normal input port.
- An input ADC port.
- An output Open Drain port.
- An output Push-Pull port.
- An output PWM port.
- Input/Output Port

The following table shows the ports used for the L04 control:

Table 9-1 Micro Controller ports overview

Pin	Name	Description	Configuration
97	INT0/ P0.5	IR	INT0
98	P1.0/ INT1	TV_IRQ	INT2
99	P1.1/ T0	TV_SC_COM	P1.1
102	P0.4/ I2SWS	EXT_MUTE	P0.4
103	P0.3/ I2SCLK	Lip Sync	I2SCLK
104	P0.2/ I2SDO2	NVM_WP	P0.2
105	P0.1/ I2SDO1	Lip Sync	I2SDO1
106	P0.0/ I2SDI/O	Lip Sync	I2SDI/O
107	P1.3/ T1	PC-TV_LED	P1.3
108	P1.6/ SCL	SCL	SCL
109	P1.7/ SDA	SDA	SDA
111	P2.0/ TPWM	SOUND_ENABLE	P2.0
112	P2.1/ PWM0	(for future use)	-
113	P2.2/ PWM1	(for future use)	-
114	P2.3/ PWM2	SEL_IF	P2.3
115	P3.0/ ADC0	Light Sensor - SDM	ADC0
116	P3.1/ ADC1	STATUS_1	ADC1
119	P3.2/ ADC2	STATUS_2	ADC2
120	P3.3/ ADC3	KEYBOARD	ADC3
122	P2.4/ PWM3	STANDBY	P2.4
123	P2.5/ PWM4	(for future use)	-
126	P1.2/ INT2	(for future use)	-
127	P1.4/ RX	HERC_RESET	-
128	P1.5/ TX	POWER_DOWN	P1.5

The description of each functional pin is explained below:

- LED.** This signal is used to drive the LED for Stand-by, Remote, and Error Indication:
  - During protection mode, the LED blinks and the set is in Stand-by mode.
  - During error conditions it blinks at a predefined rate.
  - After receiving a valid RC or local keyboard command it flashes once.
  - For sets with error message indication, the LED blinks when message is active and the set is in Stand-by mode.
- SCL.** This is the clock wire of the two-wire single master bi-directional I<sup>2</sup>C bus.
- SDA.** This is the data wire of the two-wire single master bi-directional I<sup>2</sup>C bus.
- STANDBY.** The Hercules generates this signal. This can enable the power supply in normal operation and disable it during Stand-by. It is of logic "high" (3.3 V) under normal operation and "low" (0 V) during Stand-by.
- IR.** This input pin is connected to an RC5 remote control receiver.
- SEL-IF.** This is an output pin to switch the Video SAW filter between M system and other systems.
  - 0: NTSC M (default).
  - 1: PAL B/G, DK, I, L.
- NVM\_WP.** The global protection line is used to enable and disable write protection to the NVM. When write to the NVM is required, pin 7 of the NVM must be pulled to logic "0" first (via Write\_Protect of the micro-controller pin) before a write is performed. Otherwise pin 7 of NVM must always be at logic "1"
  - 0: Disabled.
  - 1: Enabled (default).
- SOUND\_ENABLE.** This pin is use to MUTE the audio amplifier. It is configured as push pull.
- STATUS\_1.** This signal is used to read the status of the SCART 1 input (EU only).
- STATUS\_2.** This signal is used to read the status of the SCART 2 input (EU only).
- HERC\_RESET.** This pin is use to switch the +1.8 V supply.
- POWER\_DOWN.** The power supply generates this signal. Logic "high" (3.3 V) under normal operation of the TV and goes "low" (0 V) when the Mains input voltage supply goes below 70 V<sub>AC</sub>.
- KEYBOARD.** Following are the Keyboard functions and the step values (8 bit) for it.

Table 9-2 Local keyboard values

Function	Voltage (V <sub>DC</sub> )	Step values (8 bit)
P+ / Ch+	0.43	7 - 33
P- / Ch-	0.93	54 - 73
Menu (Vol - and Vol +)	1.19	74 - 96
Vol -	1.49	97 - 121
Vol +	2.12	148 - 169

- TV\_IRQ.** This signal is the interrupt from the Scaler IC.
- TV\_SC\_COM.** This signal is used for the communication with the Scaler IC.
- EXT\_MUTE.** This signal is used to reduce the switch "off" pop.

## 9.10 Abbreviation List

1080i	1080 visible lines, interlaced	FLASH	FLASH memory
1080p	1080 visible lines, progressive scan	FM	Field Memory / Frequency Modulation
2CS	2 Carrier Sound	FMR	FM Radio
2DNR	Spatial (2D) Noise Reduction	FRC	Frame Rate Converter
3DNR	Temporal (3D) Noise Reduction	FRONT-C	Front input chrominance (SVHS)
480i	480 visible lines, interlaced	FRONT-DETECT	Front input detection
480p	480 visible lines, progressive scan	FRONT-Y_CVBS	Front input luminance or CVBS (SVHS)
AARA	Automatic Aspect Ratio Adaptation: algorithm that adapts aspect ratio to remove horizontal black bars; keeping up the original aspect ratio	FTV	Flat TeleVision
ACI	Automatic Channel Installation: algorithm that installs TV channels directly from a cable network by means of a predefined TXT page	G-SC1-IN	Green SCART1 in
ADC	Analogue to Digital Converter	G-SC2-IN	Green SCART2 in
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency	G-TXT	Green teletext
AGC	Automatic Gain Control: algorithm that controls the video input of the feature box	H	H_sync to the module
AM	Amplitude Modulation	HD	High Definition
AP	Asia Pacific	HDMI	High Definition Multimedia Interface, digital audio and video interface
AR	Aspect Ratio: 4 by 3 or 16 by 9	HP	HeadPhone
ASD	Automatic Standard Detection	I	Monochrome TV system. Sound carrier distance is 6.0 MHz
AV	Audio Video	I <sup>2</sup> C	Integrated IC bus
B-SC1-IN	Blue SCART1 in	I <sup>2</sup> S	Integrated IC Sound bus
B-SC2-IN	Blue SCART2 in	IC	Integrated Circuit
B-TXT	Blue teletext	IF	Intermediate Frequency
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz	Interlaced	Scan mode where two fields are used to form one frame. Each field contains half the number of the total amount of lines. The fields are written in "pairs", causing line flicker.
BTSC	Broadcast Television System Committee	IR	Infra Red
C-FRONT	Chrominance front input	IRQ	Interrupt ReQuest
CBA	Circuit Board Assembly (or PWB)	Last Status	The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according to the customers wishes
CL	Constant Level: audio output to connect with an external amplifier	LATAM	LATIn AMERICA
CLUT	Color Look Up Table	LC04	Philips chassis name for LCD TV 2004 project
ComPair	Computer aided rePair	LCD	Liquid Crystal Display
CSM	Customer Service Mode	LED	Light Emitting Diode
CVBS	Composite Video Blanking and Synchronisation	L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
CVBS-EXT	CVBS signal from external source (VCR, VCD, etc.)	LS	LoudSpeaker
CVBS-INT	CVBS signal from Tuner	LVDS	Low Voltage Differential Signalling, data transmission system for high speed and low EMI communication.
CVBS-MON	CVBS monitor signal	M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz
CVBS-TER-OUT	CVBS terrestrial out	MOSFET	Metal Oxide Semiconductor Field Effect Transistor
DAC	Digital to Analogue Converter	MPEG	Motion Pictures Experts Group
DBE	Dynamic Bass Enhancement: extra low frequency amplification	MSP	Multi-standard Sound Processor: ITT sound decoder
DFU	Directions For Use: owner's manual	MUTE	MUTE Line
DNR	Dynamic Noise Reduction	NAFTA	North American Free Trade Association: Trade agreement between Canada, USA and Mexico
DRAM	Dynamic RAM	NC	Not Connected
DSP	Digital Signal Processing	NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, used mainly in Europe.
DST	Dealer Service Tool: special (European) remote control designed for service technicians	NTSC	National Television Standard Committee. Color system used mainly in North America and Japan. Color carrier NTSC M/N = 3.579545 MHz, NTSC 4.43 = 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)
DTS	Digital Theatre Sound	NVM	Non Volatile Memory: IC containing TV related data (for example, options)
DVD	Digital Versatile Disc	O/C	Open Circuit
DVI	Digital Visual Interface	ON/OFF LED	On/Off control signal for the LED
DW	Double Window	OSD	On Screen Display
EEPROM	Electrically Erasable and Programmable Read Only Memory	PAL	Phase Alternating Line. Color system used mainly in Western Europe (color
EU	EUrope		
EXT	EXTERNAL (source), entering the set by SCART or by cinches (jacks)		
FBL	Fast Blanking: DC signal accompanying RGB signals		
FBL-SC1-IN	Fast blanking signal for SCART1 in		
FBL-SC2-IN	Fast blanking signal for SCART2 in		
FBL-TXT	Fast Blanking Teletext		

	carrier = 4.433619 MHz) and South America (color carrier PAL M = 3.575612 MHz and PAL N = 3.582056 MHz)	WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
PC	Personal Computer	XTAL	Quartz crystal
PCB	Printed Circuit Board (or PWB)	YPbPr	Component video (Y= Luminance, Pb/Pr= Colour difference signals B-Y and R-Y, other amplitudes w.r.t. to YUV)
PDP	Plasma Display Panel		Video related signals: Y consists of luminance signal, blanking level and sync; C consists of colour signal.
PIG	Picture In Graphic	Y/C	Luminance-signal
PIP	Picture In Picture		Baseband component video (Y= Luminance, U/V= Color difference signals)
PLL	Phase Locked Loop. Used, for example, in FST tuning systems. The customer can directly provide the desired frequency	Y-OUT	
Progressive Scan	Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.	YUV	
PWB	Printed Wiring Board (or PCB)		
RAM	Random Access Memory		
RC	Remote Control transmitter		
RC5 (6)	Remote Control system 5 (6), the signal from the remote control receiver		
RGB	Red, Green, and Blue. The primary color signals for TV. By mixing levels of R, G, and B, all colors (Y/C) are reproduced.		
RGBHV	Red, Green, Blue, Horizontal sync, and Vertical sync		
ROM	Read Only Memory		
SAM	Service Alignment Mode		
SIF	Sound Intermediate Frequency		
SC	SandCastle: two-level pulse derived from sync signals		
SC1-OUT	SCART output of the MSP audio IC		
SC2-B-IN	SCART2 Blue in		
SC2-C-IN	SCART2 chrominance in		
SC2-OUT	SCART output of the MSP audio IC		
S/C	Short Circuit		
SCL	Clock signal on I <sup>2</sup> C bus		
SD	Standard Definition		
SDA	Data signal on I <sup>2</sup> C bus		
SDM	Service Default Mode		
SDRAM	Synchronous DRAM		
SECAM	SEquence Couleur Avec Memoire. Color system used mainly in France and Eastern Europe. Color carriers = 4.406250 MHz and 4.250000 MHz		
SIF	Sound Intermediate Frequency		
SMPS	Switch Mode Power Supply		
SND	SouND		
SNDL-SC1-IN	Sound left SCART1 in		
SNDL-SC1-OUT	Sound left SCART1 out		
SNDL-SC2-IN	Sound left SCART2 in		
SNDL-SC2-OUT	Sound left SCART2 out		
SNDR-SC1-IN	Sound right SCART1 in		
SNDR-SC1-OUT	Sound right SCART1 out		
SNDR-SC2-IN	Sound right SCART2 in		
SNDR-SC2-OUT	Sound right SCART2 out		
SNDS-VL-OUT	Surround sound left variable level out		
SNDS-VR-OUT	Surround sound right variable level out		
SOPS	Self Oscillating Power Supply		
S/PDIF	Sony Philips Digital InterFace		
SRAM	Static RAM		
STBY	Stand-by		
SVHS	Super Video Home System		
SW	SubWoofer / SoftWare		
THD	Total Harmonic Distortion		
TXT	TeleteXT		
uP	Microprocessor		
VL	Variable Level out: processed audio output toward external amplifier		
VCR	Video Cassette Recorder		
VGA	Video Graphics Array		
WD	Watch Dog		

9.11 IC Data Sheets

This section shows the internal block diagrams and pin layouts of ICs that are drawn as "black boxes" in the electrical diagrams (with the exception of "memory" and "logic" ICs).

9.11.1 Diagram A2, Type TDA12029H (IC7011)

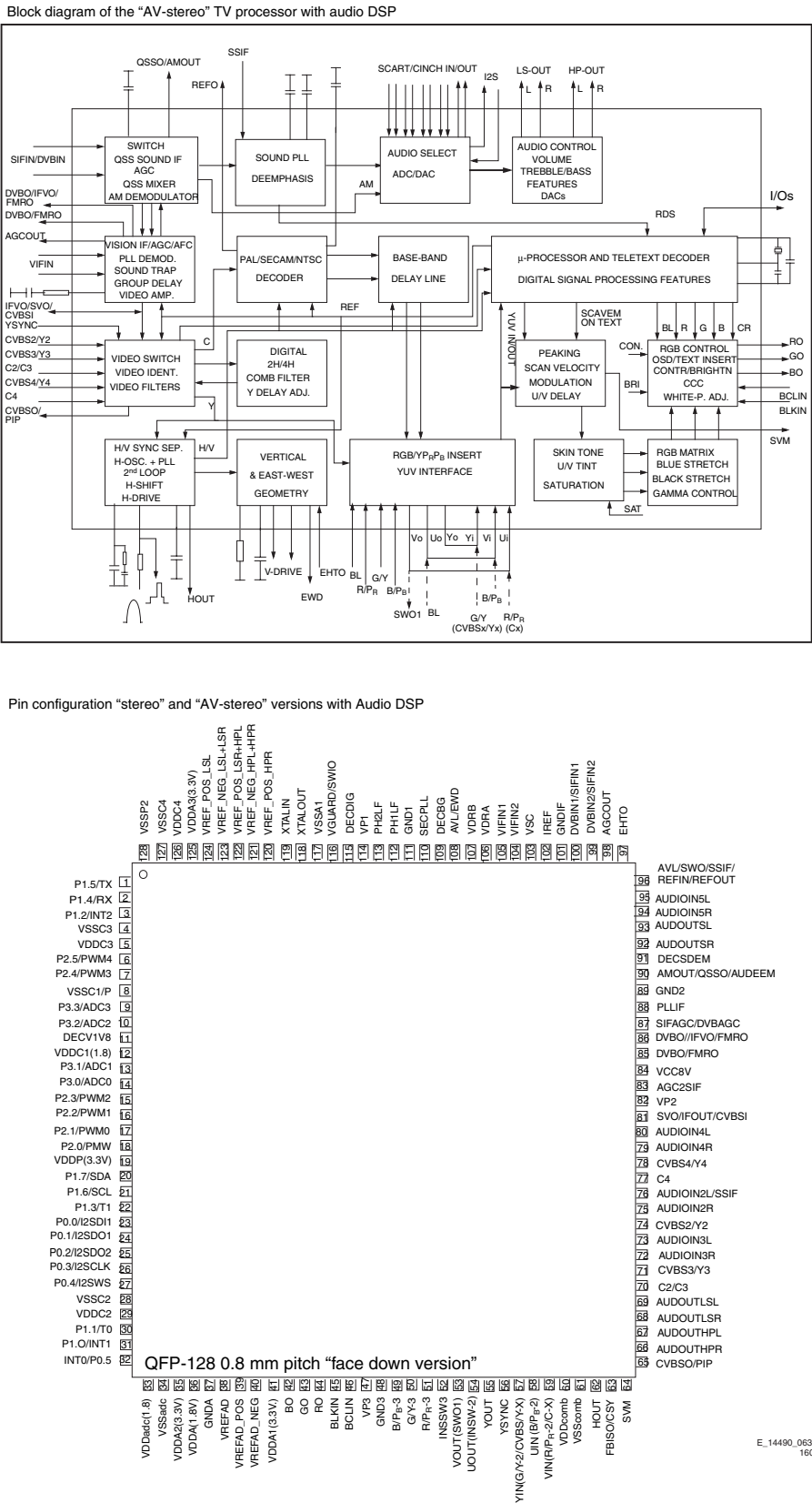
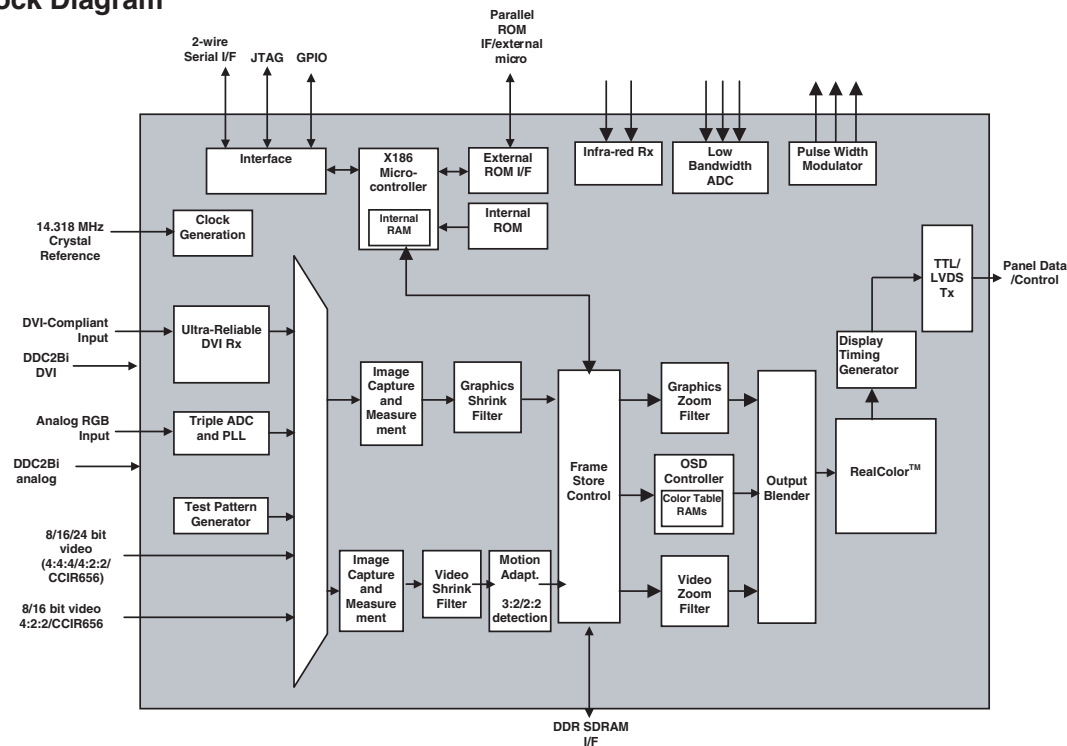


Figure 9-5 Internal Block Diagram and Pin Configuration

9.11.2 Diagram A7, Type GM1501 (IC7401)

Block Diagram



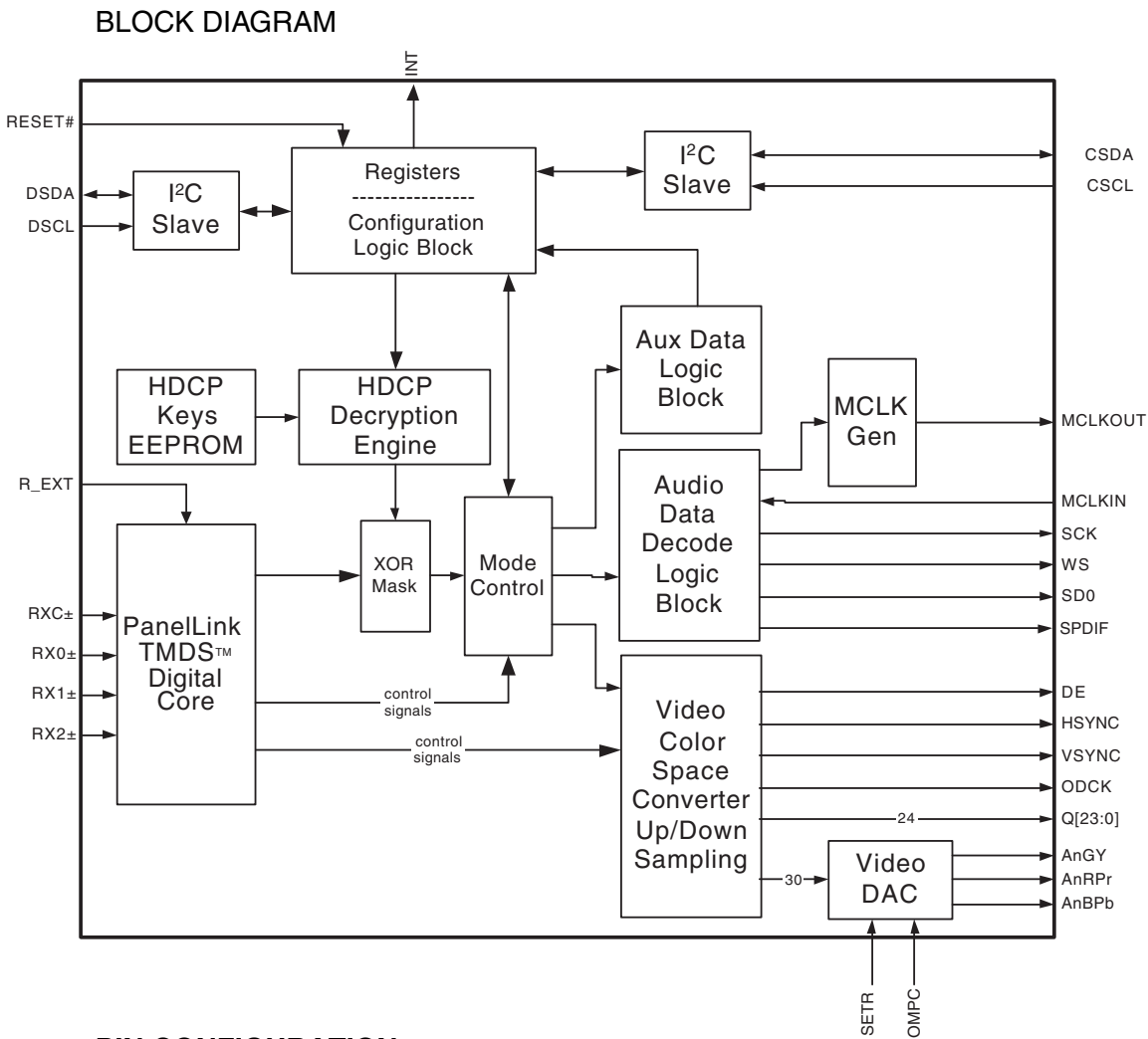
Pin Configuration

A	NC	ADC_3.3	ADC_1.8	ADC_1.8	ADC_DGND	RXC+	DVI_GND	RX0+	RX1+	RX2+	DVI_GND	LBADC_N3	D_GND
B	BLUE-	BLUE+	ADC_3.3	ADC_DGND	DVI_GND	RXC-	DVI_GND	RX0-	RX1-	RX2-	REXT	LBADC_N2	D_GND
C	GREEN-	GREEN+	SOG	ADC_AGND	NC	DVI_3.3	DVI_GND	DVI_3.3	DVI_3.3	DVI_3.3	DVI_3.3	LBADC_N1	LBADC_33
D	RED-	RED+	ADC_3.3	ADC_AGND	NC	DVI_1.8	DVI_GND	DVI_1.8	DVI_1.8	DVI_1.8	DVI_GND	LBADC_RETURN	LBADC_MGND
E	ADC_AGND	ADC_AGND	ADC_3.3	ADC_AGND									
F	NC	VDDD33_PLL	VSSA33_RPLL	VDDA33_RPLL									
G	VDDA33_FPLL	VSSD33_PLL	TCLK	XTAL									
H	VDDD33_SDDS	VSSA33_SDDS	VDDA33_SDDS	VSSA33_FPLL									
J	VDDD33_DDSD	VSSA33_DDSD	VDDA33_DDSD	VSSD33_SDDS									
K	RESETn	ACS_RSET_HD	NC	VSSD33_DDSD						CORE_1.8	CORE_1.8	D_GND	D_GND
L	OCM_INT2	OCM_INT1	AVSYNC	AHSYNC						D_GND	CORE_1.8	D_GND	D_GND
M	OCM_UD0	OCM_UD1	IR0	IR1						D_GND	D_GND	D_GND	D_GND
N	VGA_SDA	VGA_SCL	DVI_SDA	DVI_SCL						D_GND	D_GND	D_GND	D_GND
P	OCM_CS1n	OCM_CS2n	MSTR_SDA	MSTR_SCL						D_GND	D_GND	D_GND	D_GND
R	ROM_CSn	OCM_REn	OCM_WEn	EXTCLK						D_GND	D_GND	D_GND	D_GND
T	OCMADDR17	OCMADDR18	OCMADDR19	OCM_CS0n						D_GND	CORE_1.8	D_GND	D_GND
U	OCMADDR13	OCMADDR14	OCMADDR15	OCMADDR16						CORE_1.8	CORE_1.8	D_GND	D_GND
V	OCMADDR9	OCMADDR10	OCMADDR11	OCMADDR12									
W	OCMADDR6	OCMADDR7	OCMADDR8	IO_3.3									
Y	OCMADDR3	OCMADDR4	OCMADDR5	IO_3.3									
AA	OCMADDR0	OCMADDR1	OCMADDR2	IO_3.3									
AB	OCMDATA13	OCMDATA14	OCMDATA15	IO_3.3									
AC	OCMDATA10	OCMDATA11	OCMDATA12	IO_3.3	GPIO_G09_B2 (DEGRN0)	IO_3.3	DCLK	IO_3.3	GPIO_G07_B2 (DERED4)	IO_3.3	SHIELD[1] (DEGRN3)	LVDSB_3.3	LVDSB_GND
AD	OCMDATA9	OCMDATA6	OCMDATA3	OCMDATA0	GPIO_G09_B3 (DEGRN1)	GPIO_G08_B0 (DORED0)	DEN	GPIO_G08_B5 (DOBLU1)	GPIO_G07_B3 (DERED5)	GPIO_G07_B6 (DERED8)	SHIELD[2] (DEGRN4)	LVDSB_3.3	LVDSB_3.3
AE	OCMDATA8	OCMDATA5	OCMDATA2		GPIO_G09_B0 (DEBLU0)	GPIO_G08_B1 (DORED1)		GPIO_G07_B0 (DERED2)	GPIO_G07_B4 (DERED6)	GPIO_G07_B7 (DERED9)	SHIELD[3] (DEGRN5)	BC+ (DEGRN8)	SHIELD[4] (DEBLU2)
AF	OCMDATA7	OCMDATA4	OCMDATA1		GPIO_G09_B1 (DERED1)	GPIO_G08_B2 (DOGRN0)		GPIO_G07_B1 (DERED3)	GPIO_G07_B5 (DERED7)	SHIELD[0] (DEGRN2)	B3+ (DEGRN6)	B3- (DEGRN7)	BC- (DEGRN9)
	1	2	3	4	5	6	7	8	9	10	11	12	13

E\_14490\_099.eps  
060804

Figure 9-6 Internal Block Diagram and Pin Configuration

9.11.3 Diagram A12, Type Sil9993CT (IC7808)



PIN CONFIGURATION

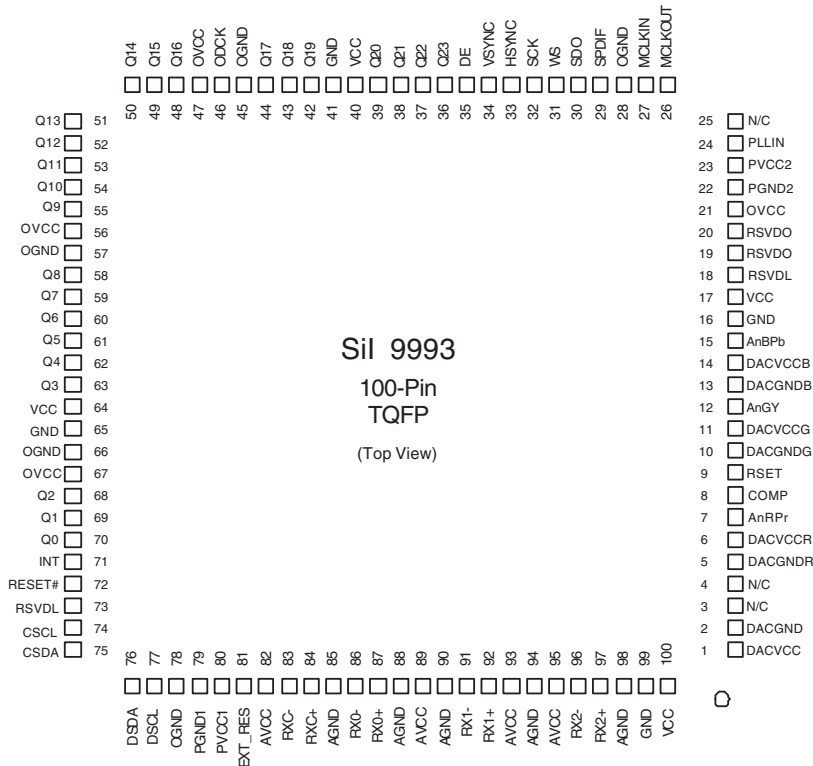


Figure 9-7 Internal Block Diagram and Pin Configuration

# 10. Spare Parts List

## Set Level

### Various

1104▲	8204 000 77241	PDP S42SD-YDO5
1104▲	8204 000 77261	PDP S37SD-YDO2
8303	3104 311 06691	Cable 10P/340/10P
8303	3104 311 08821	Cable 10P/400/10P
8330	3104 311 06091	Cable 10p/680/10p
8344	3104 311 07211	Cable 3P/560/3P
8346	3104 311 07001	Cable 11P/400/11P
8350	3104 311 08841	Cable 31P/220/31P
8352	3104 311 07381	Cable 9P/220/9P

## Small Signal Panel [A]

### Various

0601	3104 317 07891	Softw. (check Prod.Surv.)
1001	2422 543 01414	Crystal 24M576
1026	3104 328 33151	Side I/O assy
1062	2422 549 00149	Socket 3P m
1101	2422 025 18133	Socket SCART
1102	2422 025 18133	Socket SCART
1105	2422 026 05462	Socket CHINCH 4p f
1301	2422 025 16835	Connector 3p m
1302▲	3139 147 19801	Tuner UV1318S/A IH -3
1328	2422 549 44372	SAW 38.9MHz K3953L
1330	2422 549 44369	SAW 38.9MHz K9656L
1401	2422 543 01133	Xtal 14.32MHz 20pF
1402	2422 025 10768	Connector 3p m
1450	2422 025 18427	Connector 31p f
1681	2422 025 16835	Connector 3p m
1687	2438 031 00416	Connector 15p f
1752	2422 025 10769	Connector 9p m
1860	2422 549 45325	Bead 67Ω at 100MHz
1861	2422 549 45325	Bead 67Ω at 100MHz
1862	2422 549 45325	Bead 67Ω at 100MHz
1863	2422 549 45325	Bead 67Ω at 100MHz
1864	2422 549 45325	Bead 67Ω at 100MHz
8321	3122 358 76331	Tree assy M91-CP91
8336	3104 311 07111	Cable 11P/340/11P

—||—

2000	2022 552 05682	2.2μF 10% 6.3V
2001	2020 552 96718	220nF 10% 6.3V 0402
2002	4822 124 23002	10μF 16V
2003	2238 869 15109	10pF 5% 50V 0402
2004	2020 552 96718	220nF 10% 6.3V 0402
2005	3198 035 71040	100nF 10% 16V 0402
2006	3198 034 06880	6.8pF 1% 50V 0402
2007	3198 034 06880	6.8pF 1% 50V 0402
2008	3198 017 44740	470nF 10V 0603
2009	3198 017 41050	1μF 10V 0603
2010	3198 035 26820	6.8nF 10% 16V 0402
2011	2020 552 96718	220nF 10% 6.3V 0402
2012	4822 124 12095	100μF 20% 16V
2013	3198 035 71040	100nF 10% 16V 0402
2014	3198 035 71040	100nF 10% 16V 0402
2015	3198 035 71040	100nF 10% 16V 0402
2016	3198 035 71040	100nF 10% 16V 0402
2017	3198 035 71040	100nF 10% 16V 0402
2018	3198 035 71040	100nF 10% 16V 0402
2019	4822 124 80151	47μF 16V
2020	2238 869 15101	100pF 5% 50V 0402
2021	2020 552 96628	10nF 10% 16V 0402
2022	3198 035 02210	220pF 5% 50V 0402
2023	3198 035 71040	100nF 10% 16V 0402
2024	4822 124 12095	100μF 20% 16V
2025	3198 035 71040	100nF 10% 16V 0402
2026	3198 035 71040	100nF 10% 16V 0402
2027	3198 035 71040	100nF 10% 16V 0402
2028	2020 552 96628	10nF 10% 16V 0402
2029	3198 035 71040	100nF 10% 16V 0402
2030	3198 035 71040	100nF 10% 16V 0402
2031	3198 035 71040	100nF 10% 16V 0402
2032	3198 035 71040	100nF 10% 16V 0402
2033	2020 552 96718	220nF 10% 6.3V 0402
2034	2020 552 00002	3.3nF 2% 50V 0805
2035	2020 552 96656	10μF 20% 25V 1210
2036	2020 552 96807	1μF 10% 10V 0603
2037	2020 552 96807	1μF 10% 10V 0603
2040	4822 124 23002	10μF 16V
2041	2020 552 96718	220nF 10% 6.3V 0402
2042	2020 552 00002	3.3nF 2% 50V 0805

2043	3198 035 71040	100nF 10% 16V 0402
2044	2020 552 96718	220nF 10% 6.3V 0402
2045	2238 869 15109	10pF 5% 50V 0402
2046	2238 869 15109	10pF 5% 50V 0402
2047	2020 552 96628	10nF 10% 16V 0402
2048	2238 869 15109	10pF 5% 50V 0402
2049	2238 869 15109	10pF 5% 50V 0402
2050	2238 869 15109	10pF 5% 50V 0402
2051	2020 552 00002	3.3nF 2% 50V 0805
2053	2020 552 96618	1nF 10% 50V 0402
2054	2020 552 96632	22nF 10% 16V 0402
2055	4822 126 14519	22pF 5% 50V 0402
2056	3198 035 71040	100nF 10% 16V 0402
2057	2238 869 15109	10pF 5% 50V 0402
2058	2238 869 15109	10pF 5% 50V 0402
2059	2238 869 15109	10pF 5% 50V 0402
2060	3198 035 71040	100nF 10% 16V 0402
2061	4822 124 23002	10μF 16V
2062	2238 869 15109	10pF 5% 50V 0402
2063	3198 017 31540	150nF 10V 0603
2064	3198 017 41050	1μF 10V 0603
2067	2238 869 15109	10pF 5% 50V 0402
2068	2020 552 96718	220nF 10% 6.3V 0402
2069	2238 869 15109	10pF 5% 50V 0402
2070	2020 552 96834	1μF 20% 6.3V 0402
2071	4822 124 12095	100μF 20% 16V
2072	4822 126 14076	220nF +80/-20% 25V
2073	2020 552 96618	1nF 10% 50V 0402
2074	2020 552 96718	220nF 10% 6.3V 0402
2076	2020 552 96718	220nF 10% 6.3V 0402
2077	2020 552 96834	1μF 20% 6.3V 0402
2078	2238 869 15101	100pF 5% 50V 0402
2079	2238 869 15109	10pF 5% 50V 0402
2080	2238 869 15109	10pF 5% 50V 0402
2081	2238 869 15109	10pF 5% 50V 0402
2082	2020 552 96618	1nF 10% 50V 0402
2084	2020 552 96718	220nF 10% 6.3V 0402
2085	2020 552 96618	1nF 10% 50V 0402
2086	2020 552 96618	1nF 10% 50V 0402
2087	2238 869 15109	10pF 5% 50V 0402
2088	2238 869 15109	10pF 5% 50V 0402
2089	2020 552 96618	1nF 10% 50V 0402
2090	2238 869 15109	10pF 5% 50V 0402
2091	2238 869 15109	10pF 5% 50V 0402
2092	2238 869 15109	10pF 5% 50V 0402
2093	2238 869 15109	10pF 5% 50V 0402
2094	2238 869 15109	10pF 5% 50V 0402
2095	2238 869 15109	10pF 5% 50V 0402
2096	2238 869 15109	10pF 5% 50V 0402
2097	2238 869 15109	10pF 5% 50V 0402
2098	2238 869 15109	10pF 5% 50V 0402
2099	2020 552 96618	1nF 10% 50V 0402
2101	4822 126 14241	330pF 0603 50V
2103	4822 126 14241	330pF 0603 50V
2104	2020 552 96807	1μF 10% 10V 0603
2105	4822 126 14241	330pF 0603 50V
2107	4822 126 14241	330pF 0603 50V
2108	2020 552 96807	1μF 10% 10V 0603
2109	4822 126 13881	470pF 5% 50V
2110	4822 126 13881	470pF 5% 50V
2111	4822 126 13881	470pF 5% 50V
2112	4822 126 13881	470pF 5% 50V
2127	4822 126 14241	330pF 0603 50V
2128	2020 552 96807	1μF 10% 10V 0603
2129	4822 126 14241	330pF 0603 50V
2131	4822 126 14241	330pF 0603 50V
2132	2020 552 96807	1μF 10% 10V 0603
2133	4822 126 14241	330pF 0603 50V
2134	4822 126 13881	470pF 5% 50V
2135	4822 126 13881	470pF 5% 50V
2136	4822 126 13881	470pF 5% 50V
2137	4822 126 13881	470pF 5% 50V
2138	3198 017 41050	1μF 10V 0603
2152	4822 126 14241	330pF 0603 50V
2155	4822 126 14241	330pF 0603 50V
2169	4822 124 23002	10μF 16V
2251	2238 869 15109	10pF 5% 50V 0402
2252	2238 869 15109	10pF 5% 50V 0402
2253	4822 124 23002	10μF 16V
2254	4822 124 23002	10μF 16V
2255	2238 869 15109	10pF 5% 50V 0402
2262	4822 124 80151	47μF 16V
2263	2020 552 96656	10μF 20% 25V 1210
2264	2020 552 96656	10μF 20% 25V 1210
2265	3198 035 02210	220pF 5% 50V 0402
2266	2020 552 96632	22nF 10% 16V 0402
2268	2020 012 93795	470μF 20% 16V
2269	2020 012 93795	470μF 20% 16V
2271	2020 552 96628	10nF 10% 16V 0402
2302	4822 122 33761	22pF 5% 50V
2303	4822 122 33761	22pF 5% 50V
2307	3198 024 44730	47nF 50V 0603
2308	3198 030 82280	2.2μF 20% 50V
2309	2020 021 91871	470μF 20% 16V
2311	4822 124 12095	100μF 20% 16V
2321	5322 126 11583	10nF 10% 50V 0603
2324	5322 126 11583	10nF 10% 50V 0603
2355	3198 030 82280	2.2μF 20% 50V
2356	3198 030 82280	2.2μF 20% 50V
2357	3198 035 71040	100nF 10% 16V 0402
2358	2020 552 96625	3.3nF 10% 50V 0402
2359	2020 552 96628	10nF 10% 16V 0402
2370	2020 552 96834	1μF 20% 6.3V 0402
2371	2020 552 96834	1μF 20% 6.3V 0402
2372	2020 552 96618	1nF 10% 50V 0402
2373	2020 552 96618	1nF 10% 50V 0402
2374	3198 035 71040	100nF 10% 16V 0402
2375	4822 124 12082	10μF 20% 50V
2376	3198 017 41050	1μF 10V 0603
2377	3198 017 41050	1μF 10V 0603
2378	2020 552 96718	220nF 10% 6.3V 0402
2380	4822 124 12095	100μF 20% 16V
2381	3198 035 71040	100nF 10% 16V 0402
2382	2020 021 91871	470μF 20% 16V
2386	3198 017 41050	1μF 10V 0603
2387	4822 126 14324	33pF 5% 50V 0402
2388	4822 126 14324	33pF 5% 50V 0402
2392	3198 017 41050	1μF 10V 0603
2394	3198 035 71040	100nF 10% 16V 0402
2395	3198 035 71040	100nF 10% 16V 0402
2396	4822 124 23002	10μF 16V
2397	2020 552 96834	1μF 20% 6.3V 0402
2398	2020 552 96834	1μF 20% 6.3V 0402
2401	4822 124 80151	47μF 16V
2402	4822 124 80151	47μF 16V
2403	3198 035 71040	100nF 10% 16V 0402
2404	3198 035 71040	100nF 10% 16V 0402
2405	3198 035 71040	100nF 10% 16V 0402
2406	3198 035 71040	100nF 10% 16V 0402
2407	3198 035 71040	100nF 10% 16V 0402
2408	3198 035 71040	100nF 10% 16V 0402
2409	3198 035 71040	100nF 10% 16V 0402
2410	3198 035 71040	100nF 10% 16V 0402
2411	3198 035 71040	100nF 10% 16V 0402
2412	3198 035 71040	100nF 10% 16V 0402
2413	3198 035 71040	100nF 10% 16V 0402
2414	3198 035 71040	100nF 10% 16V 0402
2415	3198 035 71040	100nF 10% 16V 0402
2416	3198 035 71040	100nF 10% 16V 0402
2417	4822 124 80151	47μF 16V
2418	4822 124 80151	47μF 16V
2419	3198 035 71040	100nF 10% 16V 0402
2420	3198 035 71040	100nF 10% 16V 0402
2421	3198 035 71040	100nF 10% 16V 0402
2422	3198 035 71040	100nF 10% 16V 0402
2423	3198 035 71040	100nF 10% 16V 0402
2424	3198 035 71040	100nF 10% 16V 0402
2425	3198 035 71040	100nF 10% 16V 0402
2426	3198 035 71040	100nF 10% 16V 0402
2427	3198 035 71040	100nF 10% 16V 0402
2428	3198 035 71040	100nF 1

2456	3198 035 71040	100nF 10% 16V 0402	2632	2020 552 96834	1µF 20% 6.3V 0402	3022	4822 117 13606	10kΩ 5% 0.01W 0402
2461	3198 035 71040	100nF 10% 16V 0402	2633	2020 552 96834	1µF 20% 6.3V 0402	3023	4822 117 13601	22kΩ 5% 0402
2462	3198 035 71040	100nF 10% 16V 0402	2634	2020 552 96834	1µF 20% 6.3V 0402	3024	3198 031 01090	10Ω 5% 0.01W 0402
2463	3198 035 71040	100nF 10% 16V 0402	2635	2020 552 96834	1µF 20% 6.3V 0402	3025	3198 031 01090	10Ω 5% 0.01W 0402
2464	3198 035 71040	100nF 10% 16V 0402	2636	3198 035 71040	100nF 10% 16V 0402	3026	3198 031 06890	68Ω 5% 0402
2465	5322 124 41945	22µF 20% 35V	2681	2020 552 94427	100pF 5% 50V	3027	3198 031 01090	10Ω 5% 0.01W 0402
2466	3198 035 71040	100nF 10% 16V 0402	2686	2020 552 94427	100pF 5% 50V	3028	4822 117 11297	100kΩ 5% 0.1W
2467	3198 035 71040	100nF 10% 16V 0402	2688	2238 586 59812	100nF 20% 50V 0603	3029	4822 117 13548	1kΩ 5% 0402
2468	3198 035 71040	100nF 10% 16V 0402	2693	2238 586 59812	100nF 20% 50V 0603	3030	4822 117 11297	100kΩ 5% 0.1W
2469	3198 035 71040	100nF 10% 16V 0402	2698	2020 552 94427	100pF 5% 50V	3032	3198 031 02240	220kΩ 5% 0.1W 0402
2470	5322 124 41945	22µF 20% 35V	2699	2020 552 94427	100pF 5% 50V	3035	4822 117 13545	100Ω 1% 0402
2471	3198 035 71040	100nF 10% 16V 0402	2702	2020 552 96834	1µF 20% 6.3V 0402	3037	3198 031 04730	47Ω 5% 0402
2472	3198 035 71040	100nF 10% 16V 0402	2707	2020 021 91871	470µF 20% 16V	3038	3198 031 04730	47Ω 5% 0402
2473	3198 035 71040	100nF 10% 16V 0402	2708	2020 552 96834	1µF 20% 6.3V 0402	3040	3198 031 06830	68kΩ 5% 0.01W 0402
2474	3198 035 71040	100nF 10% 16V 0402	2710	3198 035 04710	470pF 50V 0402	3048	4822 117 13606	10kΩ 5% 0.01W 0402
2475	3198 035 71040	100nF 10% 16V 0402	2711	3198 035 04710	470pF 50V 0402	3049	4822 117 13545	100Ω 1% 0402
2476	3198 035 71040	100nF 10% 16V 0402	2713	2238 586 59812	100nF 20% 50V 0603	3050	4822 117 13545	100Ω 1% 0402
2477	3198 035 71040	100nF 10% 16V 0402	2714	2020 021 91871	470µF 20% 16V	3051	4822 117 13545	100Ω 1% 0402
2478	5322 124 41945	22µF 20% 35V	2715	2020 021 91871	470µF 20% 16V	3052	4822 117 13605	Jumper 0402
2479	3198 035 71040	100nF 10% 16V 0402	2719	2238 586 59812	100nF 20% 50V 0603	3056	3198 031 04720	4.7kΩ 5% 0402
2480	3198 035 71040	100nF 10% 16V 0402	2720	2238 869 15109	10pF 5% 50V 0402	3057	4822 117 13545	100Ω 1% 0402
2481	3198 035 71040	100nF 10% 16V 0402	2743	2020 552 96834	1µF 20% 6.3V 0402	3058	4822 117 13543	470Ω 5% 0402
2482	5322 124 41945	22µF 20% 35V	2744	2020 552 96834	1µF 20% 6.3V 0402	3059	4822 117 13548	1kΩ 5% 0402
2483	3198 035 71040	100nF 10% 16V 0402	2747	2238 869 15101	100pF 5% 50V 0402	3060	3198 031 03930	39kΩ 5% 0402
2484	3198 035 71040	100nF 10% 16V 0402	2748	2238 869 15101	100pF 5% 50V 0402	3063	3198 031 06890	68Ω 5% 0402
2485	3198 035 71040	100nF 10% 16V 0402	2749	2238 869 15101	100pF 5% 50V 0402	3065	3198 031 06810	680Ω 5% 0.01W 0402
2486	3198 035 71040	100nF 10% 16V 0402	2750	2238 869 15101	100pF 5% 50V 0402	3066	3198 031 06890	68Ω 5% 0402
2487	4822 126 14519	22pF 5% 50V 0402	2784	4822 126 14241	330pF 0603 50V	3067	3198 031 01090	10Ω 5% 0.01W 0402
2488	4822 126 14519	22pF 5% 50V 0402	2785	4822 126 14241	330pF 0603 50V	3068	3198 031 06890	68Ω 5% 0402
2490	2238 586 59812	100nF 20% 50V 0603	2847	3198 017 41050	1µF 10V 0603	3069	4822 117 13601	22kΩ 5% 0402
2491	2238 586 59812	100nF 20% 50V 0603	2848	3198 017 41050	1µF 10V 0603	3070	4822 117 13545	100Ω 1% 0402
2492	2238 586 59812	100nF 20% 50V 0603	2860	2238 869 15109	10pF 5% 50V 0402	3072	3198 031 06890	68Ω 5% 0402
2495	4822 124 80151	47µF 16V	2861	2238 869 15109	10pF 5% 50V 0402	3073	3198 031 01530	15kΩ 5% 0.01W 0402
2496	3198 035 71040	100nF 10% 16V 0402	2862	2238 869 15109	10pF 5% 50V 0402	3074	4822 117 11297	100kΩ 5% 0.1W
2501	4822 124 80151	47µF 16V	2863	2238 869 15109	10pF 5% 50V 0402	3075	3198 031 04720	4.7kΩ 5% 0402
2502	4822 124 11131	47µF 6.3V	2864	2238 869 15109	10pF 5% 50V 0402	3077	3198 031 04720	4.7kΩ 5% 0402
2503	3198 035 71040	100nF 10% 16V 0402	2865	2238 869 15109	10pF 5% 50V 0402	3078	3198 031 04720	4.7kΩ 5% 0402
2504	3198 035 71040	100nF 10% 16V 0402	2866	2238 869 15109	10pF 5% 50V 0402	3079	3198 031 04720	4.7kΩ 5% 0402
2505	3198 035 71040	100nF 10% 16V 0402	2867	2238 869 15109	10pF 5% 50V 0402	3080	5322 117 13034	1.5kΩ 1% 0.063W 0603
2506	3198 035 71040	100nF 10% 16V 0402	2868	2238 869 15109	10pF 5% 50V 0402	3081	4822 117 13545	100Ω 1% 0402
2507	3198 035 71040	100nF 10% 16V 0402	2869	2238 869 15109	10pF 5% 50V 0402	3082	3198 031 04720	4.7kΩ 5% 0402
2508	3198 035 71040	100nF 10% 16V 0402	2870	2238 869 15109	10pF 5% 50V 0402	3083	3198 031 04720	4.7kΩ 5% 0402
2509	3198 035 71040	100nF 10% 16V 0402	2871	2238 869 15109	10pF 5% 50V 0402	3084	4822 117 13545	100Ω 1% 0402
2510	3198 035 71040	100nF 10% 16V 0402	2872	2238 586 59812	100nF 20% 50V 0603	3085	3198 031 04720	4.7kΩ 5% 0402
2511	3198 035 71040	100nF 10% 16V 0402	2877	2238 869 15109	10pF 5% 50V 0402	3086	4822 117 13602	2.2kΩ 5% 0.01W 0402
2512	3198 035 71040	100nF 10% 16V 0402	2880	2238 869 15109	10pF 5% 50V 0402	3087	4822 117 13606	10kΩ 5% 0.01W 0402
2513	3198 035 71040	100nF 10% 16V 0402	2882	2238 869 15109	10pF 5% 50V 0402	3088	3198 031 03320	3.3kΩ 5% 0402
2514	3198 035 71040	100nF 10% 16V 0402	2883	2238 869 15109	10pF 5% 50V 0402	3089	3198 031 01540	150kΩ 5% 0402
2515	3198 035 71040	100nF 10% 16V 0402	2884	2020 552 96628	10nF 10% 16V 0402	3091	4822 117 13545	100Ω 1% 0402
2516	3198 035 71040	100nF 10% 16V 0402	2885	2238 869 15109	10pF 5% 50V 0402	3092	3198 031 04720	4.7kΩ 5% 0402
2517	3198 035 71040	100nF 10% 16V 0402	2886	4822 124 23002	10µF 16V	3093	3198 031 04720	4.7kΩ 5% 0402
2526	5322 124 41945	22µF 20% 35V	2887	2238 869 15109	10pF 5% 50V 0402	3094	3198 031 01090	10Ω 5% 0.01W 0402
2530	4822 124 23002	10µF 16V	2889	2238 869 15109	10pF 5% 50V 0402	3096	3198 031 03320	3.3kΩ 5% 0402
2531	3198 035 71040	100nF 10% 16V 0402	2910	3198 035 04710	470pF 50V 0402	3097	3198 031 04720	4.7kΩ 5% 0402
2532	3198 035 71040	100nF 10% 16V 0402	2911	3198 030 72290	22µF 20% 35V	3098	4822 117 13545	100Ω 1% 0402
2533	3198 035 71040	100nF 10% 16V 0402	2920	4822 124 80151	47µF 16V	3101	4822 051 30151	150Ω 5% 0.062W
2560	3198 035 71040	100nF 10% 16V 0402	2921	4822 124 80151	47µF 16V	3102	4822 117 12891	220kΩ 1%
2561	4822 124 12095	100µF 20% 16V	2930	2020 021 91871	470µF 20% 16V	3103	4822 051 30223	22kΩ 5% 0.062W
2562	3198 035 71040	100nF 10% 16V 0402	2931	3198 035 04710	470pF 50V 0402	3104	4822 117 12925	47kΩ 1% 0.063W 0603
2563	3198 035 14720	4.7nF 5% 25V 0402	2933	2020 021 91871	470µF 20% 16V	3105	4822 051 30151	150Ω 5% 0.062W
2564	2020 552 96656	10µF 20% 25V 1210	2934	2020 552 96793	4.7nF 10% 50V 0402	3106	4822 117 12891	220kΩ 1%
2580	3198 035 71040	100nF 10% 16V 0402	2935	2020 021 91871	470µF 20% 16V	3107	4822 117 12925	47kΩ 1% 0.063W 0603
2581	3198 035 71040	100nF 10% 16V 0402	2953	2020 021 91871	470µF 20% 16V	3108	4822 051 30223	22kΩ 5% 0.062W
2582	3198 035 71040	100nF 10% 16V 0402	2955	3198 035 14720	4.7nF 5% 25V 0402	3109	4822 051 30759	75Ω 5% 0.062W
2583	3198 035 71040	100nF 10% 16V 0402	2956	3198 035 02210	220pF 5% 50V 0402	3110	4822 051 30331	330Ω 5% 0.062W
2584	3198 035 71040	100nF 10% 16V 0402	2957	2020 021 91871	470µF 20% 16V	3111	4822 051 30273	27kΩ 5% 0.062W
2585	2238 869 75829	82pF 5% 50V 0402	2958	2020 021 91871	470µF 20% 16V	3112	4822 051 30682	6.8Ω 5% 0.062W
2586	2238 869 75829	82pF 5% 50V 0402	2992	3198 035 71040	100nF 10% 16V 0402	3113	4822 051 30759	75Ω 5% 0.062W
2587	3198 035 03310	330pF 5% 50V 0402	2993	2020 552 96618	1nF 10% 50V 0402	3114	4822 051 30331	330Ω 5% 0.062W
2588	3198 035 04710	470pF 50V 0402	2994	2020 021 91871	470µF 20% 16V	3115	4822 051 30759	75Ω 5% 0.062W
2605	3198 035 71040	100nF 10% 16V 0402	2995	3198 035 71040	100nF 10% 16V 0402	3116	4822 051 30331	330Ω 5% 0.062W
2606	3198 035 71040	100nF 10% 16V 0402	2996	4822 124 80151	47µF 16V	3117	4822 051 30331	330Ω 5% 0.062W
2607	3198 035 71040	100nF 10% 16V 0402				3118	4822 051 30759	75Ω 5% 0.062W
2608	3198 035 71040	100nF 10% 16V 0402				3119	4822 051 30689	68Ω 5% 0.063W 0603
2609	3198 035 71040	100nF 10% 16V 0402				3120	4822 051 30008	Jumper 0603
2610	3198 035 71040	100nF 10% 16V 0402				3121	4822 051 30759	75Ω 5% 0.062W
2611	4822 124 11131	47µF 6.3V	3000	3198 031 05620	5.6kΩ 5% 0.01W 0402	3122	4822 051 30331	330Ω 5% 0.062W
2612	2020 552 96628	10nF 10% 16V 0402	3001	2322 702 70398	3.9Ω 5% 0603	3123	4822 051 30102	1kΩ 5% 0.062W
2613	2020 552 96628	10nF 10% 16V 0402	3002	4822 117 13601	22kΩ 5% 0402	3124	4822 051 30151	150Ω 5% 0.062W
2614	2020 552 96628	10nF 10% 16V 0402	3003	2322 702 70398	3.9Ω 5% 0603	3125	4822 051 30151	150Ω 5% 0.062W
2615	2020 552 96628	10nF 10% 16V 0402	3004	4822 117 13601	22kΩ 5% 0402	3126	4822 117 12891	220kΩ 1%
2616	2020 552 96628	10nF 10% 16V 0402	3005	3198 031 05620	5.6kΩ 5% 0.01W 0402	3127	4822 051 30151	150Ω 5% 0.062W
2617	2020 552 96628	10nF 10% 16V 0402	3006	4822 117 13545	100Ω 1% 0402	3128	4822 117 12925	47kΩ 1%

3140	4822 051 30689	68Ω 5% 0.063W 0603	3437	4822 117 13606	10kΩ 5% 0.01W 0402	3713	4822 117 13606	10kΩ 5% 0.01W 0402
3141	4822 051 30102	1kΩ 5% 0.062W	3438	3198 031 11030	4 x 10kΩ 5% 1206	3716	3198 031 01220	1.2kΩ 5% 0.01W 0402
3142	4822 051 30331	330Ω 5% 0.062W	3439	3198 031 11030	4 x 10kΩ 5% 1206	3718	3198 031 03390	33Ω 1% 0402
3143	4822 051 30759	75Ω 5% 0.062W	3440	3198 031 11030	4 x 10kΩ 5% 1206	3721	3198 031 01220	1.2kΩ 5% 0.01W 0402
3144	4822 051 30151	150Ω 5% 0.062W	3441	3198 031 11030	4 x 10kΩ 5% 1206	3723	4822 117 13548	1kΩ 5% 0402
3145	4822 051 30151	150Ω 5% 0.062W	3442	3198 031 11030	4 x 10kΩ 5% 1206	3724	4822 117 13606	10kΩ 5% 0.01W 0402
3146	4822 051 30151	150Ω 5% 0.062W	3443	4822 117 13606	10kΩ 5% 0.01W 0402	3728	3198 031 05620	5.6kΩ 5% 0.01W 0402
3147	4822 051 30151	150Ω 5% 0.062W	3446	5322 117 13017	100Ω 1% 0.063W 0603	3729	3198 031 03320	3.3kΩ 5% 0402
3148	4822 051 30151	150Ω 5% 0.062W	3447	3198 031 02290	22Ω 5% 0.1W 0402	3730	3198 031 03320	3.3kΩ 5% 0402
3149	4822 051 30223	22kΩ 5% 0.062W	3448	3198 031 01090	10Ω 5% 0.01W 0402	3731	4822 117 13543	470Ω 5% 0402
3150	4822 051 30151	150Ω 5% 0.062W	3501	4822 117 12706	10kΩ 1% 0.063W 0603	3732	4822 117 13548	1kΩ 5% 0402
3151	4822 051 30151	150Ω 5% 0.062W	3502	4822 117 12706	10kΩ 1% 0.063W 0603	3733	4822 117 13543	470Ω 5% 0402
3152	4822 117 12891	220kΩ 1%	3503	2322 704 61501	150Ω 1% 0603	3739	4822 117 13601	22kΩ 5% 0402
3153	4822 051 30151	150Ω 5% 0.062W	3531	4822 117 13606	10kΩ 5% 0.01W 0402	3740	4822 117 13601	22kΩ 5% 0402
3155	4822 117 12891	220kΩ 1%	3532	4822 117 13606	10kΩ 5% 0.01W 0402	3741	4822 117 11297	100kΩ 5% 0.1W
3156	4822 051 30151	150Ω 5% 0.062W	3534	4822 117 13548	1kΩ 5% 0402	3742	4822 117 13601	22kΩ 5% 0402
3169	4822 051 30479	47Ω 5% 0.062W	3536	4822 117 13606	10kΩ 5% 0.01W 0402	3743	4822 117 13601	22kΩ 5% 0402
3251	4822 117 11151	1Ω 5%	3538	3198 031 11030	4 x 10kΩ 5% 1206	3745	4822 117 11297	100kΩ 5% 0.1W
3259	4822 117 13606	10kΩ 5% 0.01W 0402	3539	3198 031 11030	4 x 10kΩ 5% 1206	3752	3198 031 01510	150Ω 5% 0.01W 0402
3260	3198 031 06820	6.8kΩ 5% 0.01W 0402	3540	3198 031 11030	4 x 10kΩ 5% 1206	3753	3198 031 01510	150Ω 5% 0.01W 0402
3266	3198 031 04720	4.7kΩ 5% 0402	3544	3198 031 11030	4 x 10kΩ 5% 1206	3781	4822 117 12925	47kΩ 1% 0.063W 0603
3267	5322 117 13031	5.6kΩ 1% 0.063W 0603	3545	3198 031 11030	4 x 10kΩ 5% 1206	3782	4822 051 30151	150Ω 5% 0.062W
3268	2322 704 63302	3.3kΩ 1% 0603	3546	3198 031 11030	4 x 10kΩ 5% 1206	3783	4822 051 30103	10kΩ 5% 0.062W
3270	4822 117 13602	2.2kΩ 5% 0.01W 0402	3547	3198 031 11030	4 x 10kΩ 5% 1206	3784	4822 051 30102	1kΩ 5% 0.062W
3271	4822 117 13543	470Ω 5% 0402	3548	4822 117 13606	10kΩ 5% 0.01W 0402	3788	4822 051 30102	1kΩ 5% 0.062W
3273	3198 031 02240	220kΩ 5% 0.1W 0402	3549	4822 051 30102	1kΩ 5% 0.062W	3836	4822 117 13606	10kΩ 5% 0.01W 0402
3274	4822 117 13601	22kΩ 5% 0402	3550	4822 051 30102	1kΩ 5% 0.062W	3838	4822 117 13606	10kΩ 5% 0.01W 0402
3302	4822 051 30101	100Ω 5% 0.062W	3552	4822 051 30102	1kΩ 5% 0.062W	3870	3198 031 06890	68Ω 5% 0402
3303	4822 051 30101	100Ω 5% 0.062W	3553	4822 051 30102	1kΩ 5% 0.062W	3871	3198 031 06890	68Ω 5% 0402
3304	4822 117 13606	10kΩ 5% 0.01W 0402	3560	4822 117 11297	100kΩ 5% 0.1W	3877	3198 031 06890	68Ω 5% 0402
3305	4822 117 13606	10kΩ 5% 0.01W 0402	3561	4822 117 11297	100kΩ 5% 0.1W	3883	3198 031 06890	68Ω 5% 0402
3309	4822 117 13606	10kΩ 5% 0.01W 0402	3562	4822 117 11297	100kΩ 5% 0.1W	3885	3198 031 06890	68Ω 5% 0402
3311	4822 051 30103	10kΩ 5% 0.062W	3563	4822 117 13548	1kΩ 5% 0402	3886	4822 117 13606	10kΩ 5% 0.01W 0402
3319	4822 051 30273	47kΩ 5% 0.062W	3564	3198 031 01220	1.2kΩ 5% 0.01W 0402	3887	4822 117 13606	10kΩ 5% 0.01W 0402
3320	4822 051 30183	18kΩ 5% 0.062W	3565	4822 117 13548	1kΩ 5% 0402	3910	4822 117 13602	2.2kΩ 5% 0.01W 0402
3321	4822 051 30222	2.2kΩ 5% 0.062W	3566	4822 117 13548	1kΩ 5% 0402	3911	4822 117 13548	1kΩ 5% 0402
3322	4822 051 30682	6.8kΩ 5% 0.062W	3567	4822 117 13548	1kΩ 5% 0402	3930	4822 117 12917	1Ω 5% 0.062W
3323	4822 051 30222	2.2kΩ 5% 0.062W	3568	4822 117 13548	1kΩ 5% 0402	3931	4822 117 12917	1Ω 5% 0.062W
3327	4822 117 13548	1kΩ 5% 0402	3579	4822 117 13548	1kΩ 5% 0402	3932	2322 704 61002	1kΩ 1%
3328	4822 117 13545	100Ω 1% 0402	3580	4822 117 13543	470Ω 5% 0402	3933	2322 704 63302	3.3kΩ 1% 0603
3329	4822 117 13545	100Ω 1% 0402	3581	3198 031 04730	47Ω 5% 0402	3951	4822 117 12917	1Ω 5% 0.062W
3340	4822 117 13601	22kΩ 5% 0402	3605	4822 117 13545	100Ω 1% 0402	3952	4822 117 12917	1Ω 5% 0.062W
3342	4822 117 13606	10kΩ 5% 0.01W 0402	3606	4822 117 13545	100Ω 1% 0402	3953	2322 704 61002	1kΩ 1%
3343	3198 031 04720	4.7kΩ 5% 0402	3607	4822 117 13545	100Ω 1% 0402	3954	2322 704 63302	3.3kΩ 1% 0603
3344	4822 117 13548	1kΩ 5% 0402	3608	4822 117 13545	100Ω 1% 0402	4002	4822 117 13605	Jumper 0402
3345	3198 031 04720	4.7kΩ 5% 0402	3609	4822 117 13545	100Ω 1% 0402	4005	4822 117 13605	Jumper 0402
3346	2322 706 75603	56kΩ 1% 0402	3610	4822 117 13601	22kΩ 5% 0402	4007	4822 117 13605	Jumper 0402
3347	3198 031 08210	820Ω 5% 0.5W	3612	4822 117 13543	470Ω 5% 0402	4008	4822 117 13605	Jumper 0402
3348	3198 031 04720	4.7kΩ 5% 0402	3613	3198 031 02290	22Ω 5% 0.1W 0402	4017	4822 117 13605	Jumper 0402
3349	3198 031 01820	1.8kΩ 5% 0.01W 0402	3614	3198 031 02290	22Ω 5% 0.1W 0402	4018	4822 117 13605	Jumper 0402
3357	4822 117 13548	1kΩ 5% 0402	3615	3198 031 02290	22Ω 5% 0.1W 0402	4023	4822 117 13605	Jumper 0402
3358	4822 117 13545	100Ω 1% 0402	3616	3198 031 02290	22Ω 5% 0.1W 0402	4062	4822 117 13605	Jumper 0402
3359	3198 031 03910	390Ω 1% 0402	3617	3198 031 02290	22Ω 5% 0.1W 0402	4255	4822 117 13605	Jumper 0402
3370	3198 031 06810	680Ω 5% 0.01W 0402	3618	3198 031 02290	22Ω 5% 0.1W 0402	4327	4822 051 30008	Jumper 0603
3371	4822 117 13545	100Ω 1% 0402	3619	3198 031 08210	820Ω 5% 0.5W	4331	4822 051 30008	Jumper 0603
3372	4822 117 13545	100Ω 1% 0402	3620	4822 117 13632	100kΩ 1% 0603 0.62W	4333	4822 051 30008	Jumper 0603
3374	5322 117 11726	10Ω 5%	3621	4822 117 13601	22kΩ 5% 0402	4334	4822 051 30008	Jumper 0603
3378	4822 117 13545	100Ω 1% 0402	3622	4822 117 13601	22kΩ 5% 0402	4360	4822 117 13605	Jumper 0402
3380	3198 031 05620	5.6kΩ 5% 0.01W 0402	3623	4822 117 13601	22kΩ 5% 0402	4361	4822 117 13605	Jumper 0402
3381	3198 031 05620	5.6kΩ 5% 0.01W 0402	3624	4822 117 13601	22kΩ 5% 0402	4362	4822 117 13605	Jumper 0402
3382	3198 031 05620	5.6kΩ 5% 0.01W 0402	3625	4822 117 13601	22kΩ 5% 0402	4363	4822 117 13605	Jumper 0402
3383	3198 031 05620	5.6kΩ 5% 0.01W 0402	3626	4822 117 13601	22kΩ 5% 0402	4580	4822 117 13605	Jumper 0402
3386	4822 117 13545	100Ω 1% 0402	3633	4822 117 13545	100Ω 1% 0402	4581	4822 117 13605	Jumper 0402
3389	4822 117 13545	100Ω 1% 0402	3634	4822 117 13545	100Ω 1% 0402	4583	4822 117 13605	Jumper 0402
3390	4822 117 13545	100Ω 1% 0402	3635	4822 117 13545	100Ω 1% 0402	4590	4822 117 13605	Jumper 0402
3391	4822 117 13545	100Ω 1% 0402	3638	4822 117 13545	100Ω 1% 0402	4601	4822 117 13605	Jumper 0402
3392	4822 117 13545	100Ω 1% 0402	3639	4822 117 13545	100Ω 1% 0402	4602	4822 117 13605	Jumper 0402
3393	4822 117 13545	100Ω 1% 0402	3641	4822 117 13597	330Ω 5% 0402 0.01W	4603	4822 117 13605	Jumper 0402
3394	3198 031 07590	75Ω 5% 0402	3642	4822 117 13597	330Ω 5% 0402 0.01W	4608	4822 117 13605	Jumper 0402
3401	2350 035 10229	4 x 22Ω 5% 1206	3643	4822 117 13597	330Ω 5% 0402 0.01W	4708	4822 051 30008	Jumper 0603
3402	2350 035 10229	4 x 22Ω 5% 1206	3644	4822 117 13597	330Ω 5% 0402 0.01W	4714	4822 117 13605	Jumper 0402
3403	2350 035 10229	4 x 22Ω 5% 1206	3645	4822 117 13597	330Ω 5% 0402 0.01W	4720	4822 051 30008	Jumper 0603
3404	2350 035 10229	4 x 22Ω 5% 1206	3646	4822 117 13597	330Ω 5% 0402 0.01W	4836	4822 051 30008	Jumper 0603
3405	2350 035 10229	4 x 22Ω 5% 1206	3680	4822 051 30222	2.2kΩ 5% 0.062W	4838	4822 051 30008	Jumper 0603
3406	2350 035 10229	4 x 22Ω 5% 1206	3681	4822 051 30221	220Ω 5% 0.062W	4888	4822 117 13605	Jumper 0402
3407	2350 035 10229	4 x 22Ω 5% 1206	3683	4822 051 30759	75Ω 5% 0.062W			
3408	2350 035 10229	4 x 22Ω 5% 1206	3684	4822 051 30759	75Ω 5% 0.062W			
3409	2350 035 10229	4 x 22Ω 5% 1206	3685	4822 051 30222	2.2kΩ 5% 0.062W			
3410	2350 035 10229	4 x 22Ω 5% 1206	3686	4822 051 30221	220Ω 5% 0.062W			
3411	2350 035 10229	4 x 22Ω 5% 1206	3687	4822 051 30759	75Ω 5% 0.062W	5001	2422 536 00667	1000μF 20% 7032
3412	2350 035 10229	4 x 22Ω 5% 1206	3689	4822 051 30101	100Ω 5% 0.062W	5002	4822 157 11716	Bead 30Ω at 100MHz
3413	2350 035 10229	4 x 22Ω 5% 1206	3693	4822 051 30103	10kΩ 5% 0.062W	5003	4822 157 11716	Bead 30Ω at 100MHz
3414	3198 031 02290	22Ω 5% 0.1W 0402	3696	4822 051 30103	10kΩ 5% 0.062W	5004	4822 157 11716	Bead 30Ω at 100MHz
3415	3198 031 01090	10Ω 5% 0.01W 0402	3697	4822 051 30103	10kΩ 5% 0.062W	5005	4822 157 11716	Bead 30Ω at 100MHz
3422	3198 031 02290	22Ω 5% 0.1W 0402	3698	4822 051 30223	22kΩ 5% 0.062W	5006	4822 157 11716	Bead 30Ω at 100MHz
3423	3198 031 03320	3.3kΩ 5% 0402	3699	4822 051 30223	22kΩ 5% 0.062W	5007	4822 157 11716	Bead 30Ω at 100MHz
3424	2322 704 61501	150Ω 1% 0603	3700	4822 117 12925	47kΩ 1% 0.063W 0603	5008	4822 157 11716	Bead 30Ω at 100MHz
3425								

5139	4822 051 20008	Jumper 0805
5251	2422 549 45333	Bead 120Ω 100MHz
5252	2422 549 45333	Bead 120Ω 100MHz
5259	2422 549 45333	Bead 120Ω 100MHz
5262	2422 535 94134	10μH 20% 0805
5267	2422 536 00339	33μ 20%
5268	2422 535 94995	10μF 20% 10145
5304	4822 157 11499	Bead 60Ω at 100MHz
5309	3198 018 31290	12μH 10%
5321	3198 018 33970	0.39μF 10% 0805
5324	4822 157 71334	0.68μH 5% 1008
5370	4822 157 11716	Bead 30Ω at 100MHz
5371	4822 157 11716	Bead 30Ω at 100MHz
5372	4822 157 11716	Bead 30Ω at 100MHz
5530	2422 549 45333	Bead 120Ω 100MHz
5560	4822 157 11716	Bead 30Ω at 100MHz
5580	4822 157 71304	1μH 10% 0805
5605	2422 549 45333	Bead 120Ω 100MHz
5607	2422 549 45333	Bead 120Ω 100MHz
5636	2422 549 45333	Bead 120Ω 100MHz
5680	2422 549 45333	Bead 120Ω 100MHz
5683	2422 549 45333	Bead 120Ω 100MHz
5684	2422 549 45333	Bead 120Ω 100MHz
5685	2422 549 45333	Bead 120Ω 100MHz
5686	2422 549 45333	Bead 120Ω 100MHz
5687	2422 549 45333	Bead 120Ω 100MHz
5720	4822 157 11716	Bead 30Ω at 100MHz
5721	4822 157 11716	Bead 30Ω at 100MHz
5722	4822 157 11716	Bead 30Ω at 100MHz
5872	4822 157 11716	Bead 30Ω at 100MHz
5882	3198 018 51080	1μH 10% 0603
5910	2422 536 00667	1000μF 20% 7032
5920	2422 549 45333	Bead 120Ω 100MHz
5930	2422 535 94134	10μH 20% 0805
5931	2422 536 00689	220μF 20%
5932	2422 535 94134	10μH 20% 0805
5952	2422 535 94134	10μH 20% 0805
5953	2422 536 00689	220μF 20%
5954	2422 535 94134	10μH 20% 0805
5984	2422 549 45333	Bead 120Ω 100MHz
5985	2422 549 45333	Bead 120Ω 100MHz
5986	2422 549 45333	Bead 120Ω 100MHz
5987	2422 549 45333	Bead 120Ω 100MHz
5988	2422 549 45333	Bead 120Ω 100MHz
5989	2422 549 45333	Bead 120Ω 100MHz
5990	2422 549 45333	Bead 120Ω 100MHz
5991	2422 549 45333	Bead 120Ω 100MHz
5994	2422 549 45333	Bead 120Ω 100MHz
5996	2422 549 45333	Bead 120Ω 100MHz
5997	2422 549 45333	Bead 120Ω 100MHz
5998	2422 549 45333	Bead 120Ω 100MHz



6001	4822 130 11397	BAS316
6002	4822 130 11397	BAS316
6005	9340 553 52115	BAS321
6020	4822 130 11397	BAS316
6021	4822 130 11397	BAS316
6075	4822 130 80622	BAT54
6076	4822 130 80622	BAT54
6121	4822 130 11416	PDZ6.8B
6143	4822 130 11416	PDZ6.8B
6259	9322 128 70685	SMSS14
6262	3198 010 10720	SS24
6267	3198 010 10730	SS36
6270	4822 130 10837	UDZS8.2B
6310	4822 130 11397	BAS316
6323	4822 130 11525	1SS356
6328	4822 130 11416	PDZ6.8B
6329	4822 130 11416	PDZ6.8B
6330	4822 130 11416	PDZ6.8B
6331	4822 130 11416	PDZ6.8B
6563	9322 102 64685	UDZ2.7B
6564	4822 130 11416	PDZ6.8B
6565	4822 130 10838	UDZ3.3B
6604	4822 130 11397	BAS316
6605	4822 130 11397	BAS316
6634	9322 102 64685	UDZ2.7B
6635	9322 102 64685	UDZ2.7B
6638	9322 102 64685	UDZ2.7B
6639	9322 102 64685	UDZ2.7B
6693	4822 130 11397	BAS316
6701	3198 020 55680	BZX384-C5V6
6910	5322 130 34337	BAV99
6911	9340 548 71115	PDZ33B
6930	9322 128 70685	SMSS14
6951	9322 128 70685	SMSS14



7001	9339 693 90135	BCP69-25
------	----------------	----------

7002	9340 425 20115	BC847BS
7003	9339 693 90135	BCP69-25
7004	3198 010 42310	BC847BW
7005	9340 547 13215	BSH103
7011		For SW see item 0601
7012	3198 010 42310	BC847BW
7013	3198 010 42310	BC847BW
7014	3198 010 42310	BC847BW
7015	9322 208 05668	SM NE555D
7016	9322 208 05668	SM NE555D
7017	9322 208 05668	SM NE555D
7018	5322 130 60159	BC846B
7019	5322 130 60159	BC846B
7051	3104 317 07511	Softw. (check Prod.Surv.)
7052	3104 317 06722	Softw. (check Prod.Surv.)
7053	3104 317 06742	Softw. (check Prod.Surv.)
7054	3104 317 06691	Softw. (check Prod.Surv.)
7075	4822 130 11155	PDTC114ET
7099		For SW see item 7052
7119	5322 130 60159	BC846B
7138	5322 130 60159	BC846B
7260	9322 139 16668	LF33CPT
7262	9322 202 34668	L5973D
7271	3198 010 42310	BC847BW
7272	3198 010 42310	BC847BW
7320	3198 010 42310	BC847BW
7370	9340 550 49115	PUMH7
7371	9340 550 49115	PUMH7
7372	9340 550 49115	PUMH7
7376	9340 425 10115	BC857BS
7377	9340 425 10115	BC857BS
7401	9322 206 86671	GM1501-BD
7501	9322 199 17671	K4D263238M-QC50
7530		For SW see item 7051
7531		For SW see item 7053
7532	9352 691 71115	NE56610-27GW
7560	9352 334 10118	TDA9178T/N1
7561	3198 010 42310	BC847BW
7562	9322 199 24668	L7808CD2T
7563	4822 209 73852	PMBT2369
7579	4822 130 11155	PDTC114ET
7580	9322 199 16668	M74HC590T
7581	9322 199 16668	M74HC590T
7582	9322 201 05671	CY62256LL-70ZC
7583	9351 870 00118	74HC573PW
7584	9351 870 00118	74HC573PW
7585	3198 010 42310	BC847BW
7604	9352 607 39118	74LVC14APW
7605	4822 209 60792	74HC4053D
7606	9322 199 56668	ADG781BCP
7607	9322 199 80668	SM5301BS-G
7693		For SW see item 7054
7706	9351 742 70118	74HC08PW
7708	9340 425 20115	BC847BS
7710	9340 310 50215	PDTA143ET
7713	3198 010 42310	BC847BW
7714	3198 010 42310	BC847BW
7740	9322 183 05668	TS482ID
7872	9352 686 35118	PCA9515DP
7887	3198 010 42310	BC847BW
7910	4822 130 42804	BC817-25
7920	9322 163 24668	L78M08CDT
7930	5322 209 90529	MC34063AD
7952	5322 209 90529	MC34063AD
7992	9322 142 88668	LF25CDT
7995	9322 189 19668	LD1086D2T18

## PDP Audio [C]

### Various

1735	2422 025 10768	Connector 3p m
1736	2422 025 10768	Connector 3p m
1739	2422 025 10769	Connector 9p m
1M02	2422 025 11244	Connector 7p m
8302	3104 311 07591	Cable 7P/820/7P



2702	5322 126 11578	1nF 10% 50V 0603
2704	5322 126 11578	1nF 10% 50V 0603
2705	2020 552 96684	470nF 10% 25V 0805
2706	2222 580 15649	100nF 10% 50V 0805
2707	4822 126 14585	100nF 10% 0805 50V
2708	2020 552 96326	220nF 10% 16V
2709	4822 126 13881	470pF 5% 50V
2710	4822 126 13881	470pF 5% 50V
2711	5322 126 11578	1nF 10% 50V 0603
2712	2020 552 96684	470nF 10% 25V 0805
2713	2020 552 96684	470nF 10% 25V 0805
2714	4822 126 14549	33nF 16V 0603


2715	5322 126 11578	1nF 10% 50V 0603
2716	4822 126 14241	330pF 0603 50V
2717	5322 121 42498	680nF 5% 63V
2718	4822 122 33761	22pF 5% 50V
2719	5322 126 11578	1nF 10% 50V 0603
2720	2020 552 96326	220nF 10% 16V
2721	4822 126 13881	470pF 5% 50V
2722	4822 126 13881	470pF 5% 50V
2724	2020 552 96684	470nF 10% 25V 0805
2726	4822 126 14549	33nF 16V 0603
2727	5322 126 11578	1nF 10% 50V 0603
2728	4822 126 14241	330pF 0603 50V
2729	5322 121 42498	680nF 5% 63V
2730	2020 552 96684	470nF 10% 25V 0805
2764	4822 126 14491	2.2μF 10V 0805
2766	4822 126 14491	2.2μF 10V 0805
2768	4822 124 40255	100μF 20% 63V
2769	4822 124 40255	100μF 20% 63V
2777	2020 552 96683	220nF 10% 50V
2778	4822 124 40769	4.7μF 20% 100V
2779	2020 552 96683	220nF 10% 50V
2780	2020 552 96683	220nF 10% 50V
2781	2020 552 96683	220nF 10% 50V
2783	4822 124 81151	22μF 50V
2786	2238 586 15641	22nF 10% 50V 0603
2788	4822 124 40255	100μF 20% 63V
2789	2020 552 96684	470nF 10% 25V 0805
2790	4822 124 40255	100μF 20% 63V



3701	4822 051 30103	10kΩ 5% 0.062W
3702	4822 051 30682	6.8Ω 5% 0.062W
3703	4822 051 30333	33kΩ 5% 0.062W
3704	4822 117 10833	10kΩ 1% 0.1W
3705	4822 051 20828	8.2Ω 5% 0.1W
3706	4822 051 30472	4.7Ω 5% 0.062W
3707	4822 051 30683	68kΩ 5% 0.062W
3708	4822 051 30563	56kΩ 5% 0.062W
3709	4822 117 11503	220Ω 1% 0.1W
3710	4822 051 30223	22kΩ 5% 0.062W
3711	4822 050 21204	120kΩ 1% 0.6W
3712	4822 051 30103	10kΩ 5% 0.062W
3713	4822 116 52207	1.2kΩ 5% 0.5W
3714	4822 117 12925	47kΩ 1% 0.063W 0603
3715	4822 117 12925	47kΩ 1% 0.063W 0603
3716	4822 117 12925	47kΩ 1% 0.063W 0603
3717	4822 116 52234	100kΩ 5% 0.5W
3718	4822 117 13632	100kΩ 1% 0603 0.62W
3721	4822 051 30472	4.7Ω 5% 0.062W
3722	4822 051 30683	68kΩ 5% 0.062W
3723	4822 051 30563	56kΩ 5% 0.062W
3724	4822 117 11503	220Ω 1% 0.1W
3725	4822 051 30223	22kΩ 5% 0.062W
3726	4822 117 11503	220Ω 1% 0.1W
3727	4822 117 11503	220Ω 1% 0.1W
3743	4822 117 11449	2.2kΩ 5% 0.1W 0805
3746	4822 051 30223	22kΩ 5% 0.062W
3747	4822 117 12925	47kΩ 1% 0.063W 0603
3748	4822 116 83883	470Ω 5% 0.5W
3750	4822 117 11449	2.2kΩ 5% 0.1W 0805
3756	4822 117 11449	2.2kΩ 5% 0.1W 0805
3757	4822 117 11449	2.2kΩ 5% 0.1W 0805
3760	4822 117 12891	220kΩ 1%
3761	4822 051 20109	10Ω 5% 0.1W
3762	4822 051 20109	10Ω 5% 0.1W
3763	4822 117 13632	100kΩ 1% 0603 0.62W
3764	4822 051 30222	2.2kΩ 5% 0.062W
3765	4822 051 30222	2.2kΩ 5% 0.062W
3766	4822 117 13632	100kΩ 1% 0603 0.62W
3767	4822 117 13632	100kΩ 1% 0603 0.62W
3768	4822 117 13632	100kΩ 1% 0603 0.62W
3790	4822 051 30272	2.7kΩ 5% 0.062W
3791	4822 051 30272	2.7kΩ 5% 0.062W
3792	4822 051 30103	10kΩ 5% 0.062W
3793	4822 051 30103	10kΩ 5% 0.062W
3798	4822 051 30153	15kΩ 5% 0.062W
3999	4822 051 30101	100Ω 5% 0.062W
9717	4822 051 30008	Jumper 0603



5701	2422 536 00385
------	----------------

		
6701	4822 130 11397	BAS316
6710	4822 130 11551	UDZS10B
6711	4822 130 11551	UDZS10B



7700	9322 163 86682	TDA7490L
7701	3198 010 42310	BC847BW
7703	3198 010 42310	BC847BW
7704	3198 010 42310	BC847BW
7705	3198 010 42310	BC847BW
7706	3198 010 42320	BC857BW
7707	3198 010 42310	BC847BW
7710	3198 010 42310	BC847BW
7711	3198 010 42310	BC847BW
7712	3198 010 42310	BC847BW
7713	3198 010 42310	BC847BW

Side I/O [D]

Various

1001	2422 033 00442	Connector 2P f
1002	2422 026 05587	Sock Cinch 2P f RdWh



2004	4822 126 14241	330pF 0603 50V
2005	2020 552 94427	100pF 5% 50V
2006	4822 126 14241	330pF 0603 50V
2007	2020 552 94427	100pF 5% 50V



3000	4822 051 30759	75Ω 5% 0.062W
3004	4822 051 30759	75Ω 5% 0.062W
3009	4822 051 30102	1kΩ 5% 0.062W
3010	4822 051 30333	33kΩ 5% 0.062W
3012	4822 051 30102	1kΩ 5% 0.062W
3013	4822 051 30333	33kΩ 5% 0.062W
9001	4822 051 30008	Jumper 0603
9002	4822 051 30008	Jumper 0603
9004	4822 051 30008	Jumper 0603
9005	4822 051 30008	Jumper 0603
9007	4822 051 30008	Jumper 0603



6000	4822 130 11416	PDZ6.8B
6001	4822 130 11416	PDZ6.8B
6002	4822 130 11416	PDZ6.8B
6003	4822 130 11416	PDZ6.8B
6004	4822 130 11416	PDZ6.8B
6005	4822 130 11416	PDZ6.8B
6006	4822 130 11416	PDZ6.8B
6007	4822 130 11416	PDZ6.8B

Top Control [E]

Various

0345	4822 267 10459	Connector 3p
1701	2422 128 02778	Tact switch
1702	2422 128 02778	Tact switch
1703	2422 128 02778	Tact switch
1704	2422 128 02778	Tact switch
1705	2422 128 02778	Tact switch
8345	3104 311 06551	Cable 3P/1300/3P



3001	4822 051 20391	390Ω 5% 0.1W
3003	4822 117 13528	200Ω 1% 0.125W 0805
3005	4822 117 11951	2kΩ 1% 0.1W
3009	4822 117 11534	1.1kΩ 1% 0.1W
3011	4822 117 10845	620Ω 1% 0.1W
3999	4822 051 20471	470Ω 5% 0.1W
9001	4822 051 20008	Jumper 0805
9003	4822 051 20008	Jumper 0805
9005	4822 051 20008	Jumper 0805
9006	4822 051 20008	Jumper 0805

EMC Filter [EMC]

Various

1320	2422 025 16545	Connector 10p m
1330	2422 025 16545	Connector 10p m
1345	2422 025 16835	Connector 3p m
1355	2422 025 16835	Connector 3p m



2300	5322 126 11583	10nF 10% 50V 0603
2301	5322 126 11583	10nF 10% 50V 0603
2302	3198 016 31020	1nF 25V 0603
2303	5322 126 11583	10nF 10% 50V 0603
2304	5322 126 11583	10nF 10% 50V 0603
2305	5322 126 11583	10nF 10% 50V 0603
2306	5322 126 11583	10nF 10% 50V 0603
2307	5322 126 11583	10nF 10% 50V 0603
2308	5322 126 11583	10nF 10% 50V 0603



3300	4822 051 30101	100Ω 5% 0.062W
3301	4822 051 30101	100Ω 5% 0.062W
3302	4822 051 30101	100Ω 5% 0.062W
3303	4822 051 30101	100Ω 5% 0.062W
3304	4822 051 30101	100Ω 5% 0.062W
3305	4822 051 30101	100Ω 5% 0.062W
3306	4822 051 30101	100Ω 5% 0.062W
3307	4822 051 30101	100Ω 5% 0.062W



5300	2422 549 43062	Bead 600Ω at 100MHz
5301	2422 549 43062	Bead 600Ω at 100MHz
5302	2422 549 43062	Bead 600Ω at 100MHz
5303	2422 549 43062	Bead 600Ω at 100MHz
5304	2422 549 43062	Bead 600Ω at 100MHz
5305	2422 549 43062	Bead 600Ω at 100MHz
5306	2422 549 43062	Bead 600Ω at 100MHz
5307	2422 549 43062	Bead 600Ω at 100MHz
5308	2422 549 43062	Bead 600Ω at 100MHz
5309	2422 549 43062	Bead 600Ω at 100MHz
5310	2422 549 43062	Bead 600Ω at 100MHz
5311	2422 549 43062	Bead 600Ω at 100MHz
5312	2422 549 43062	Bead 600Ω at 100MHz
5313	2422 549 43062	Bead 600Ω at 100MHz

LED + Switch [J]

Various

0320	2422 025 16545	Connector 10p m
1101	2422 128 03123	Switch 2p 2pos 30V




2107	4822 124 12095	100μF 20% 16V
2120	3198 030 71090	10μF 20% 35V
2126	4822 126 14583	470nF 10% 16V 0805



3101	4822 051 30151	150Ω 5% 0.062W
3103	4822 051 30331	330Ω 5% 0.062W
3105	4822 051 30681	680Ω 5% 0.062W
3106	4822 051 30151	150Ω 5% 0.062W
3107	4822 051 30471	47Ω 5% 0.062W
3108	4822 051 30103	10kΩ 5% 0.062W
3109	4822 051 30101	100Ω 5% 0.062W
3120	4822 051 30472	4.7Ω 5% 0.062W
3121	4822 051 30103	10kΩ 5% 0.062W
3122	4822 051 30332	3.3Ω 5% 0.062W
3123	4822 051 30332	3.3Ω 5% 0.062W
3124	4822 051 30102	1kΩ 5% 0.062W
3126	2322 702 60335	3.3MΩ 5% 0603
3127	2322 702 60335	3.3MΩ 5% 0603
3128	4822 051 30472	4.7Ω 5% 0.062W
4101	4822 051 30008	Jumper 0603
4107	4822 051 30008	Jumper 0603
4108	4822 051 30008	Jumper 0603
4111	4822 051 30008	Jumper 0603



5100	2422 549 43769	Bead 30Ω at 100MHz
------	----------------	--------------------

		
6101	4822 130 11564	UDZ3.9B
6103	4822 130 83915	TLMV3100
6105	4822 130 11564	UDZ3.9B
6127	9322 140 63685	TEMD5000



7103	3198 010 42320	BC857BW
7105	3198 010 42320	BC857BW
7107	9322 206 81667	TSOP34836YA1
7120	5322 209 82941	LM358D

# 11. Revision List

**Manual xxxx xxx xxxx.0**

- First release.

**Manual xxxx xxx xxxx.1**

- Second release.  
Block diagrams and schematics updated.  
Description of white tone alignment added.